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PROF. PAPATYA KARAKURT
ASSOC. PROF. MERYEM FIRAT

TRANSFORMATION IN HEALTHCARE: CLINICAL NURSING CARE, ARTIFICIAL INTELLIGENCE, AND FUTURE PERSPECTIVES



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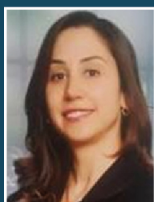
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Preface

The rapid transformation of healthcare systems has necessitated a multidimensional re-evaluation of nursing practice, integrating clinical expertise with emerging technological advancements and evolving population health needs. In this context, nursing has expanded beyond its traditional boundaries, assuming a critical role at the intersection of patient-centered care, innovation, and interdisciplinary collaboration.

This book has been developed to provide a comprehensive and contemporary perspective on key issues shaping modern nursing. The chapters encompass a wide range of topics, including the prevention of bleeding risk following coronary artery bypass graft surgery, health risks in young adulthood, and the management of geriatric syndromes such as frailty and sarcopenia in clinical settings. In addition, the integration of digital health tools, such as mobile applications in the care of patients with eating disorders, is explored as an essential component of current practice.

A significant focus of this volume is the growing influence of artificial intelligence in healthcare. The development, opportunities, and challenges associated with artificial intelligence are critically examined, alongside its implications for nursing practice. Particular attention is given to the professional concerns arising from technological advancements and the necessity of maintaining a balance between artificial intelligence and emotional intelligence in delivering holistic and compassionate care.

This book aims to serve as a valuable resource for nurses, healthcare professionals, and researchers by presenting evidence-based insights and fostering a deeper understanding of both clinical and technological dimensions of care. It also seeks to contribute to the ongoing discourse on how nursing can effectively adapt to and shape the future of healthcare while preserving its core humanistic values.

We extend our sincere appreciation to all contributing authors for their scholarly efforts and commitment. It is our hope that this work will contribute meaningfully to the advancement of nursing knowledge and practice, and inspire further research and innovation in the field.

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CHAPTER 1

THE EFFECT OF NURSING CARE ON PREVENTING BLEEDING RISK AFTER CORONARY ARTERY BYPASS GRAFT (CABG) SURGERY

Sibel ÇİMEN¹

Hakime ASLAN²

Abstract

Coronary Artery Bypass Graft (CABG) is a major surgical procedure aimed at restoring continuity by bypassing atherosclerotic blockages in the coronary arteries using venous or arterial channels. Bypass restores blood flow to the ischemic myocardium. Blood flow alleviates anginal symptoms caused by ischemia. This operation improves quality of life and longevity in the treatment of coronary artery disease. Bleeding is one of the complications that may occur during and after coronary artery bypass graft surgery. Nurses are responsible for closely monitoring patients in the postoperative period and providing follow-up care and treatment. Nurses must be aware of factors related to bleeding and be able to monitor them. Knowing the factors related to bleeding allows nursing care to be planned and implemented in advance.

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Thanks to the anticipated priority of care, complications related to bleeding can be prevented and the associated mortality and morbidity can be reduced. Nurses' ability to detect bleeding quickly through their postoperative monitoring and assessment will improve the quality of care and patient safety. Nursing care requires assessment not only after surgery but also from the preoperative period onwards. Postoperative bleeding control is particularly critical during the first 6 hours. Blood pressure, pulse, urine output, and chest tube drainage should be monitored and recorded hourly. Monitoring and interpreting hematological parameters is very important. Drainage exceeding 300 ml in the first hour is considered an indication for re-exploration. In addition, the development of tachycardia and hypotension following a sudden cessation of drainage flow indicates a risk of cardiac tamponade and requires urgent intervention. The nurse must closely monitor the patient, communicate with the team about the process, and have pre-determined nursing care measures for risks. The literature has limited studies explaining the effect of nursing care on directly preventing bleeding risk. This review addresses the role of nursing care in reducing bleeding risk after coronary artery bypass grafting. Increasing the number of current studies aimed at identifying factors that trigger bleeding after coronary artery bypass graft surgery will enable nurses to prioritize care by specifically addressing the risk factors for 'bleeding', identifying existing risks early, and planning care in advance, in addition to postoperative surgical patient care. It is necessary to share current studies through training programs and to encourage staff to participate in conferences, symposiums, and certification programs so that nurses working in these units can plan the necessary and critical care for bleeding.

Keywords: Coronary Artery Bypass Graft, Nursing Care, Bleeding

Introduction

The average mortality rate in coronary revascularization surgeries is 6.2%. When valve surgeries are included, this rate rises to 10%. Severe bleeding increases this rate to 20%. Despite advances in surgical techniques, anesthesia, and intensive care, bleeding following heart surgery remains a serious problem. At this stage, it is necessary to identify nursing diagnoses of risk and take precautions before the problem develops. (13,14,15) Although coronary artery bypass graft surgery is used as a standard method to increase myocardial perfusion and reduce cardiac mortality, it can lead to serious complications such as bleeding in the postoperative period. Early detection of complications and timely intervention are crucial for patient safety. However, previous studies have not addressed in detail the nursing care required for bleeding that may

occur directly after coronary artery bypass surgery. This study focused on the impact of nursing care on preventing bleeding risk by prioritizing the nurse's knowledge load, bleeding risk diagnosis, and care plan.

Method

This study was conducted as a classic review.

Findings

Coronary Artery Bypass Graft Surgery

Coronary artery disease is among the leading causes of death. The right and left coronary arteries supply blood to the myocardium. Coronary artery disease occurs due to narrowing of the coronary arteries. Coronary artery disease, which develops due to myocardial ischemia, causes angina pectoris, myocardial infarction, and sudden cardiac death in patients. The goal of surgery is to revascularize the myocardium by applying a bypass graft from the saphenous vein, internal mammary artery, gastroepiploic artery, radial artery, or inferior epigastric artery, whichever is suitable for the patient, to the blockage in the coronary artery. (1,2,5)

Bleeding After Coronary Artery Bypass Graft (CABG) Surgery

The cause of bleeding after cardiovascular surgery can be classified as surgical or non-surgical. In half of the patients who undergo revision after bleeding, there is no surgical source of bleeding. The patients' bleeding is due to coagulopathy. Cardiopulmonary bypass carries a risk of predisposing to bleeding. This intervention triggers the complement system, systemic inflammatory response, and complement activation, impairing platelet adhesion and aggregation. Another factor triggering this process is the hypothermia applied during the surgical procedure. Hypothermia slows down coagulative enzyme activity and leads to the inhibition of clotting factors. (3,4)

Nursing Care in Preventing Bleeding

The goal of nursing care for a patient who has undergone coronary artery bypass graft surgery is to support the patient's recovery and improve their quality of life. By preparing the patient and their family during the perioperative period, utilizing expertise during the intraoperative period, and combining comprehensive knowledge with nursing skills and compassion during the

postoperative period, the adverse effects of all risk factors, particularly the risk of bleeding, can be prevented. (10) Preoperatively, the nurse should monitor and interpret the patient's results for hemogram, prothrombin time, and activated partial thromboplastin time. These values enable the nurse to detect bleeding risk early and ensure patient safety before surgery.

After coronary artery bypass surgery, the patient is monitored in the intensive care unit. The quality of nursing care directly affects the success of the surgical procedure. The patency of drains and the amount of fluid collected are very important for the early detection of bleeding after surgery. It is expected that the dark red fluid collected in the first few hours will gradually turn serous pink. Sudden hypotension, tachycardia, fullness in the neck veins, decreased urine output, chest pain, and respiratory distress should raise suspicion of bleeding and the risk of cardiac tamponade associated with it. (7,8) In the intensive care unit and on the ward, nurses must regularly check and monitor the pulse and blood pressure to monitor for bleeding. Monitoring the drainage volume is critically important. During the first 24 hours, especially the first 6 hours, drainage of 1.5 mL/kg/hour indicates active bleeding. (11)

Systemic hypothermia is used during cardiac surgery to reduce metabolic rate and protect organs. (12) Continued hypothermia can cause bleeding, arrhythmia, and neurological complications, making postoperative temperature control very important for nurses. Potential hypothermia should be closely monitored during the first 8 hours postoperatively, and body temperature should be gradually increased. (2,9) To prevent potential risks, risk nursing diagnoses must be determined in advance, and nursing care plans targeting these must be implemented.

Risk of Bleeding Nursing Diagnosis

Risk of Bleeding: The likelihood of bleeding developing, leading to a decrease in blood volume in the circulatory system due to compromised vascular integrity or problems with the coagulation mechanism. Patient characteristics, surgical procedures, cardiopulmonary bypass, and pharmacological factors may contribute to this risk. The purpose of the nursing diagnosis of Bleeding Risk is to identify early signs, maintain hemodynamic balance, and prevent bleeding. Blood pressure, heart rate, central venous pressure, and urine output are the parameters for hemodynamic monitoring. The development of hypotension is the earliest sign that bleeding may occur. Hourly drainage monitoring, surgical incisions, and dressings should be observed. The presence of hematoma and ecchymosis should be assessed; the presence of blood in the mouth, nose, urine, and stool should be investigated. Laboratory monitoring and interpretation

should be performed. Anticoagulant drug therapy and monitoring should be administered, and the patient should be protected from trauma. The patient and family should be in communication with healthcare professionals from the preoperative period until discharge. (16,17)

Conclusions and Recommendations

Nursing care requires the ability to consider and implement many things simultaneously. It demands a heavy knowledge load, experience, communication skills, critical thinking, decision-making, and the ability to act quickly. Nurses must be able to identify risk factors in advance and plan care accordingly. They must be able to perform hemodynamic monitoring and follow up on chest tubes and drainage systems. They must be aware of the risk of hypothermia and monitor blood gases for metabolic acidosis. There must be fast and active communication with the team. The active role of the nurse and nursing care will support the success of the surgical procedure. The number of studies directly addressing potential complications, especially life-threatening ones, that may arise after surgical procedures should be increased. Current studies and evidence-based practices should be presented to nurses through training, and their participation in educational conferences and symposiums that will support their development should be encouraged. Potential risks can be identified and managed in advance by nurses through the use of new teaching methods such as simulation.

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CHAPTER 2

THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF HEALTH

Bayram Egemen GÜNDOĞDU¹

Esra ÇAYLAK ALTUN²

ABSTRACT

Artificial Intelligence (AI) represents a pivotal element in the digital transformation of healthcare, with significant potential to improve patient safety, care efficiency, and resource utilization. This narrative review explores the evolution of AI in healthcare, emphasizing its implications from a nursing perspective. The objective is to assess AI applications in clinical care, patient monitoring, education, and ethical considerations, while evaluating its integration into nursing practice.

The review methodology encompassed a comprehensive search of databases including PubMed, CINAHL, Scopus, Web of Science, Google Scholar, and TR Dizin, covering publications from 2015 to 2025. Keywords in Turkish and English (e.g., “artificial intelligence”, “nursing”, “clinical decision support”, “early warning systems”, “patient monitoring”, “nursing education”, “ethics”, “nurse anxiety”) were employed to identify peer-reviewed articles, systematic

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reviews, and reports focused on AI's impact in health and nursing. Studies outside healthcare or unrelated to nursing were excluded.

In healthcare, AI utilizes machine learning and deep learning for applications such as radiology diagnostics, sepsis prediction, and intensive care monitoring. Within nursing, AI-driven early warning systems can detect clinical deterioration 6-48 hours in advance, alleviating workload burdens. In education, AI-enhanced simulation tools bolster students' clinical reasoning and skills. Nonetheless, challenges persist, including ethical issues like data privacy, algorithmic bias, and transparency; technology-related anxiety; and concerns over professional role shifts. In Turkey, national strategies foster AI adoption, though gaps in education and infrastructure pose barriers.

In conclusion, AI should serve as a complementary tool in nursing, underpinned by human oversight, ethical frameworks, and enhanced digital literacy training. This balanced integration will elevate care quality and fortify the profession's future trajectory.

1. Introduction

Healthcare services have made digital transformation mandatory due to factors such as increasing complexity of care, heightened patient safety expectations, the exponential growth in the volume of clinical data, and workforce shortages. One of the most important components of this transformation is artificial intelligence (AI), which includes systems capable of learning from big data, recognizing patterns, generating predictions, and strengthening decision-support processes. However, the use of AI in healthcare must be addressed not only in terms of technical efficiency and speed, but also within the framework of patient safety, ethical responsibility, data privacy, algorithmic fairness, transparency, and human oversight principles (WHO, 2021; WHO, 2024).

Nursing is one of the healthcare disciplines most directly affected by AI applications due to its continuous patient monitoring, clinical decision-making, care coordination, and direct responsibility for patient safety. While AI-based systems hold significant potential to reduce nurses' workload, standardize care processes, enable early detection of risks, and optimize resource utilization, they simultaneously bring to the fore critical issues such as the redefinition of professional roles, the emergence of new competency requirements, concerns about automation, and the need to preserve human oversight in clinical judgment (Booth et al., 2021; Ventura-Silva et al., 2024).

Evidence from recent years indicates that AI can be effective in nursing care organization (including workflow optimization, prioritization, care planning, and early warning systems); however, the success of these applications depends on data quality, system reliability, explainability, clinical integration, and nurses' acceptance of the technology (Hassanein et al., 2025; El Arab et al., 2025). For this reason, evaluating the integration of AI into nursing practice on scientific, ethical, and professional grounds is of critical importance for protecting patient safety and correctly positioning the future of nursing.

This article aims to examine the current applications of artificial intelligence in healthcare services from a nursing perspective.

Methods

This study was designed as a narrative review examining the development of artificial intelligence (AI) in the healthcare field.

Databases: PubMed, CINAHL, Scopus, PsycINFO, Web of Science, Google Scholar, and TR Dizin.

Keywords: “yapay zekâ”, “hemşirelik”, “klinik karar destek”, “erken uyarı sistemleri”, “hasta izleme”, “hemşirelik eğitimi”, “etik”, “hemşire kaygısı”. For English-language literature, the terms “artificial intelligence”, “nursing”, “clinical decision support”, “early warning systems”, “patient monitoring”, “nursing education”, “ethics”, “nurse anxiety” were also used.

Time Frame: Studies published between 2015 and 2025 were included.

Inclusion Criteria:

- Original research articles, systematic/scoping reviews, and reports published in peer-reviewed journals focusing on AI in healthcare and nursing (clinical care, education, decision support, early warning systems, ethical/attitudinal dimensions).
- Publications examining the impact of AI on nursing practice.
- Articles and reports published in Turkish or English.

Exclusion Criteria:

- Studies outside the healthcare domain.
- Studies focused on non-nursing health professionals or general health technologies without explicit linkage to nursing practice and care processes.
- Publications available only as conference abstracts without full text.

- Articles and reports published before 2015.

In total, the identified studies were reviewed, duplicate publications were removed, and the remaining articles were classified according to content similarities and synthesized under the following headings: the concept of artificial intelligence and its definition in healthcare, the development of AI in healthcare, the importance and current status of AI in nursing, AI and clinical decision support systems in clinical care, patient monitoring and early warning systems, AI and simulation applications in nursing education, and technology anxiety and acceptance processes among nurses.

1. The Concept of Artificial Intelligence and Its Definition in the Healthcare Field

Artificial intelligence (AI) refers to technologies that enable computer systems to mimic human-like abilities in learning, problem solving, pattern recognition, and decision making. In the healthcare domain, AI is predominantly based on machine learning approaches (supervised and unsupervised), deep learning (including convolutional and recurrent neural networks), and natural language processing models. These systems derive meaningful predictions from clinical data sources such as electronic health records (EHR), vital signs, imaging studies, and laboratory results perform risk scoring, and provide decision support (WHO, 2021; Ahmed, 2024).

In healthcare, AI achieves accuracy comparable to or in some cases superior to human experts in disease detection in radiology and pathology, while also delivering early warnings for critical conditions such as sepsis and acute kidney injury, thereby improving patient outcomes. However, because model performance is heavily dependent on the quality and diversity of training data, there is widespread consensus that AI should be used as a complementary tool to augment physicians' clinical judgment and must always remain under human supervision and oversight (WHO, 2021; Ahmed, 2024; WHO, 2024).

In contemporary applications, AI is employed across a broad spectrum ranging from diagnostic support systems and early warning mechanisms to triage optimization and personalized care planning. Nevertheless, due to the "black box" nature of many AI models, the lack of explainability, and the potential for bias in training datasets, the necessity for ethical, legal, and clinical oversight is strongly emphasized (WHO, 2024).

2. The Development of Artificial Intelligence in Healthcare

The rapid development of artificial intelligence (AI) in healthcare has been made possible by the widespread adoption of electronic health records (EHRs), the strengthening of big data infrastructures, increases in computational capacity, and the proliferation of open datasets. AI-based systems have begun to enter routine clinical practice, particularly in areas such as medical imaging (radiology and pathology), intensive care monitoring, sepsis prediction, fall risk forecasting, and patient flow management (Ahmed, 2024; Ruksakulpiwat et al., 2025).

The pace of AI development in healthcare has accelerated significantly in recent years with the integration of large language models and multimodal approaches. This enables more comprehensive decision support by jointly evaluating not only images but also clinical notes, laboratory results, and patient histories (Ahmed, 2024).

International reports highlight that AI offers substantial opportunities to enhance patient safety, care quality, and resource efficiency. At the same time, they emphasize the necessity of high-quality data standards, algorithmic transparency, continuous validation, and human-centered governance mechanisms to ensure safe and ethical use (WHO, 2024).

In Türkiye, the National Artificial Intelligence Strategy 2021–2025 (updated 2024–2025) and initiatives coordinated by TÜSEB/TÜYZE such as the TEKNOFEST Healthcare AI Competitions are actively promoting the adoption of AI in healthcare services and focusing on the development of domestic solutions (T.C. Cumhurbaşkanlığı Dijital Dönüşüm Ofisi, 2021/2025; TÜSEB/TÜYZE, 2025).

3. The Importance and Current Status of Artificial Intelligence in Nursing

Artificial intelligence (AI) supports fundamental nursing processes such as clinical monitoring, risk management, care planning, documentation, and patient education. Recent studies demonstrate that AI based early warning systems can detect clinical deterioration 6–24 hours in advance, improve the accuracy of nurses' prioritization decisions, and significantly reduce workload (Ventura-Silva et al., 2024; Hassanein et al., 2025).

However, the impact of AI extends beyond technical benefits. Nurses' and nursing students' attitudes toward AI, their levels of digital literacy, intention

to accept technology, and awareness of ethical issues play a decisive role in the safe and effective implementation of these systems (El Arab et al., 2025; Nas et al., 2025). Research conducted in Türkiye reveals that nurses' awareness of AI is at a moderate-to-high level; nevertheless, deficiencies in training, ethical concerns, integration challenges, and worries about professional autonomy remain widespread (Nurkalem & Gülseven Karabacak, 2025; İlaslan, 2023).

Therefore, while AI holds considerable potential to elevate the quality of care in nursing, it also represents a strategic area of transformation concerning the preservation of professional roles, adherence to ethical principles, and the development of digital competencies.

3.1. Artificial Intelligence and Clinical Decision Support Systems in Clinical Care

Artificial intelligence (AI) based clinical decision support systems (CDSS) possess the capacity to analyze patient data in real time within nursing care, thereby determining care priorities, performing risk scoring, and providing intervention recommendations. Recent studies indicate that AI can predict clinical deterioration 6–48 hours in advance by integrating vital signs, laboratory results, and electronic health records (Ventura-Silva et al., 2024; Hassanein et al., 2025).

Particularly in intensive care units and acute care settings, AI supported systems enhance nurses' speed of intervention in the early detection of high-mortality conditions such as sepsis, respiratory failure, and sudden cardiac events, ultimately improving patient outcomes (Hassanein et al., 2025). However, the effectiveness of these systems depends on data quality, algorithmic explainability, and seamless clinical integration. The literature emphasizes that AI should assume a supportive rather than a decision-making role, and that nurses' clinical judgment must always remain paramount (Wei et al., 2025; American Nurses Association [ANA], 2025).

AI based CDSS hold significant potential to reduce workload in nursing and enhance patient safety; they particularly contribute to the prevention of critical events through early warning signals during shift handovers and periods of high patient acuity. At the same time, to minimize the risk of alarm fatigue, the development of adaptive threshold values and personalized alert filters is recommended. Furthermore, regular training programs and simulation-based applications are advocated to be integrated into clinical practice so that nurses can effectively utilize AI tools (Ventura-Silva et al., 2024).

3.2. Patient Monitoring and Early Warning Systems

Artificial intelligence (AI) supported early warning systems (EWS) utilize big data analytics in patient monitoring to evaluate physiological trends and detect potential deterioration at an early stage. Nursing-focused systems (for example, the CONCERN Early Warning System) analyze nurses' narrative notes and documentation patterns using machine learning, enabling alerts 1–2 days earlier than traditional vital sign-based systems (Cato et al., 2025). These systems have been shown to reduce in-hospital mortality, lower sepsis risk, and shorten average length of stay (Ahmed, 2024; Namdar Areshtanab et al., 2025).

AI supported early warning systems, particularly in intensive care units and general wards, enable real-time monitoring to identify signs of clinical deterioration even when vital signs appear stable. This allows nurses to intervene proactively, thereby reducing code blue (cardiac arrest) calls and emergency transfers (Ahmed, 2024; Cato et al., 2025).

However, the success of these systems depends on minimizing false positive alerts (false alarms) and on the development of adaptive threshold values and personalized risk profiles (Cato et al., 2025; Ahmed, 2024; Namdar Areshtanab et al., 2025).

Recent reviews indicate that these technologies reduce nurses' workload, optimize care prioritization, and enhance patient safety (Ahmed, 2024; Namdar Areshtanab et al., 2025). Nevertheless, effective utilization requires nurses' positive attitudes toward technology, strong clinical interpretive skills, and seamless integration of alerts into existing workflows.

3.3. Artificial Intelligence and Simulation Applications in Nursing Education

Artificial intelligence (AI) is creating a significant transformation in nursing education by providing personalized learning pathways, clinical scenario simulations, and performance feedback. AI-supported simulation tools such as chatbots, virtual patients, and large language models enable students to develop clinical reasoning, communication, and patient safety skills in a risk-free environment (Doston et al., 2025; Chan et al., 2025).

AI supported simulations offer nursing students the opportunity to repeatedly experience high-stress or rare clinical situations (e.g., postoperative hemorrhage, delirium management, difficult family communication) without any risk to real patients. This repeated exposure strengthens decision-making skills and increases self-confidence (Doston et al., 2025; Chan et al., 2025).

National studies have demonstrated that AI based educational applications enhance learning motivation, support the acquisition of clinical skills, and strengthen feedback processes (Nas et al., 2025; Nurkalem & Gülseven Karabacak, 2025; İlaslan, 2023). The international literature highlights that AI makes rare scenarios repeatable and contributes to the development of humanistic aspects such as empathy training (Cho et al., 2024).

However, the sustainability of effectiveness depends on educators' digital competence, data security, and successful integration into the curriculum. AI based tools should be positioned as complementary to classical methods rather than as replacements.

4. Technology Anxiety and Acceptance Processes Among Nurses

The rapid integration of artificial intelligence (AI) and digital technologies into healthcare services is subjecting the nursing profession to a profound transformation process, while simultaneously delivering significant gains in accuracy, speed, and predictive power in patient care. However, this change also brings with it technology-related anxiety among nurses, ethical uncertainties, concerns about job security, and apprehensions regarding role changes (Nurkalem & Gülseven Karabacak, 2025).

4.1. Technology Anxiety and Attitudes

Technology anxiety, triggered by the rapid integration of artificial intelligence (AI), can generate feelings of inadequacy, fear of making errors, and concerns about loss of control among nurses. Recent research indicates that as clinical decision support systems become more widespread, nurses experience anxiety related to professional competence and the sharing of responsibility (Nurkalem & Gülseven Karabacak, 2025; Bodur et al., 2025).

Studies reveal that nurses generally exhibit moderate-to-high awareness of AI; however, they adopt a cautious attitude due to knowledge gaps, ethical uncertainties, and insufficient training (Nas et al., 2025; İlaslan, 2023). Anxiety levels are inversely related to prior experience with AI use and individuals' degree of personal innovativeness. Educational programs and ethical guidelines have proven effective in reducing these anxieties. In this context, integrating AI literacy and practical application modules into nursing curricula stands out as a critical step in managing anxieties and promoting the safe adoption of technology (Nurkalem & Gülseven Karabacak, 2025; Bodur et al., 2025).

Awareness tends to be higher among younger nurses and those who actively follow technological developments. It is emphasized that supporting this integration at both individual and institutional levels can more effectively alleviate anxieties. Furthermore, the establishment of continuous professional development activities and ethical discussion platforms can encourage nurses to adopt AI with confidence, ultimately contributing to long-term improvements in the quality of patient care (Nurkalem & Gülseven Karabacak, 2025; Bodur et al., 2025).

4.2. Job Security and Role Transformation Concerns

The automation of routine tasks by artificial intelligence (AI) can lead to concerns among nurses regarding role changes and job security. The literature emphasizes that AI does not replace nursing; rather, by providing support in data analysis and prediction, it strengthens nurses' patient-centered roles (Al Khatib & Ndiaye, 2025; Nashwan & Abujaber, 2023).

Nurses maintain their central position in areas such as clinical reasoning, empathy, and ethical responsibility, while AI makes care processes more efficient. This transformation should be viewed not as a threat to professional autonomy, but as an opportunity that necessitates the development of digital competencies. Therefore, nursing education and continuous professional development programs must be rapidly updated to support the effective and safe use of AI technologies (Al Khatib & Ndiaye, 2025; Nashwan & Abujaber, 2023).

These updates, encompassing both theoretical knowledge and simulation-based practical applications, can prepare nurses to work effectively in integration with AI. At the same time, emphasizing collaboration with multidisciplinary teams and the recognition of AI's limitations will further enhance the quality of patient-centered care (Al Khatib & Ndiaye, 2025; Nashwan & Abujaber, 2023).

4.3. Ethical and Legal Concerns

The use of artificial intelligence (AI) in healthcare gives rise to ethical and legal risks, including data privacy, algorithmic bias, the "black box" problem, and ambiguity in the distribution of responsibility (WHO, 2024; ANA, 2025). In nursing, when AI-supported recommendations are incorrectly implemented, the allocation of responsibility among the nurse, the institution, and the developer remains unclear. Bias in training datasets can lead to disparities in care for certain patient groups (Ventura-Silva et al., 2024).

For these reasons, AI applications must be supported by principles of human-centered design, explainability, continuous auditability, and ethical governance. Furthermore, regular training for nurses on AI technologies can play a critical role in managing these risks and safeguarding patient safety (Ventura-Silva et al., 2024).

Such training enhances nurses' ability to recognize the limitations and potential errors of AI, enabling them to make more informed and proactive decisions. At the same time, strengthening mechanisms for collaboration with ethics committees and multidisciplinary teams will help clarify the sharing of risks, thereby contributing to the protection of both patients and healthcare professionals (Ventura-Silva et al., 2024).

5. Conclusion and Recommendations

Artificial intelligence (AI) is transforming the nursing profession by automating routine tasks, thereby freeing nurses to devote more time to direct patient interaction, empathy, and complex clinical reasoning. It enhances patient safety, enables earlier detection of clinical deterioration, and supports evidence-based care processes. Its contributions are particularly evident in intensive care, emergency services, and chronic disease management. In nursing education, personalized simulations and learning analytics are equipping the next generation of nurses with stronger competencies.

However, several risks persist, including data privacy concerns, algorithmic bias, lack of transparency, potential loss of clinical judgment due to automation, and anxieties related to professional identity. In Türkiye, widespread adoption is limited by disparities in digital infrastructure, inequalities in training access, and challenges in cultural adaptation.

The nursing of the future will embrace technology as a supportive tool while keeping the human element at its core. The most powerful role of AI is to empower nurses rather than replace them. The key determinants of success include:

- Mandatory educational programs that enhance nurses' AI literacy,
- Human-centered system designs that prioritize explainability and ethical governance,
- Preservation of nurses' final authority in clinical decision-making processes.

When this balance is achieved, AI will render nursing safer, more effective, more humane, and more sustainable.

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CHAPTER 3

HEALTH RISKS IN YOUNG ADULthood AND PUBLIC HEALTH NURSING APPROACHES

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Aslı KALKIM²

Abstract

Young adulthood is a stage of life characterized by significant life transitions such as achieving economic independence, building a family, and pursuing career goals, during which psycho-social stressors intensify. The risky health behaviors adopted and lifestyle habits established during this period lead to significant consequences in the long term, such as a decline in individuals' quality of life, loss of workforce, an increase in the prevalence of chronic diseases, and an increased patient burden on the healthcare system. The literature identifies accidents and injuries, violence, suicidal tendencies, substance abuse, mental health disorders, sexually transmitted infections, obesity, environmental health problems, and digital addictions as priority health issues in young adulthood that carry mortality and morbidity risks. The lack of structured health policies and monitoring programs targeting young adulthood in Türkiye is noteworthy. Public health nurses play important roles in managing these risks at the primary, secondary, and tertiary levels of prevention. In this context,

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public health nursing approaches should include risk assessment, collaboration, the development of solution-focused models, and advocacy for the protection and promotion of health. Public health nurses have the potential to influence community health by increasing health literacy and continuously monitoring individuals through school, university, and workplace-based interventions.

Keywords: Young Adulthood, Risk Approach, Public Health Nursing.

Introduction

Although there is no universally accepted international definition of young adulthood, various classifications have been made by scientists and organizations based on age. The United Nations (UN) and the World Health Organization (WHO) define young adulthood as individuals aged 15-24 (United Nations, 2025; World Health Organization, n.d.). The American Society for Adolescent Health and Medicine (ASAHM) defines young adulthood as individuals aged 18-25 and emphasizes that this period is a unique and critical developmental stage (The Society for Adolescent Health and Medicine, 2017). From an American developmental psychology perspective, Jeffrey Jensen Arnett conceptualized this transitional period between adolescence and adulthood as “emerging adulthood” and defined its boundaries as ages 18-25. According to Arnett’s theoretical framework, this transitional period represents a process in which the individual has neither completely broken away from the structure of adolescence nor fully assumed the permanent social roles (employment, parental responsibilities, etc.) that adulthood brings, and in which identity exploration and uncertainty are quite strong. The role ambiguity that emerges with increasing individual autonomy and decreasing parental control makes individuals more vulnerable to risky health behaviors (substance use, irregular eating, sedentary lifestyle) and psychosocial problems (Arnett, 2000). Therefore, young adulthood should be considered not only a biological maturation phase but also a critical life stage for the prevention of chronic diseases and the establishment of healthy lifestyle behaviors.

Globally, the young adult population aged 15-24 reaches 1.2 billion, representing approximately 10% of the world’s population (United Nations, 2024). Despite being considered the most resilient stage of the life cycle and having low mortality expectations, young adults lose their lives due to various preventable etiological factors. According to World Bank (2023) data, mortality rates among the 15–24 age group vary significantly across regions (Figure 1). Death rates are particularly high in Sub-Saharan African countries (18 or more deaths per 1,000 young people). This situation is considered a direct reflection of socio-economic determinants such as poverty, high prevalence

of infectious diseases, limited access to health services, and malnutrition. In contrast, youth mortality rates are low (ranging from 2 to 5 per 1,000) in some regions of Western Europe, North America, Australia, and East Asia. Low mortality rates in these regions are associated with strong health systems, widespread preventive health services, high levels of education, and effective social support mechanisms for young people. In the Middle East, Latin America, and Central Asia, youth mortality rates are moderate and show a heterogeneous distribution across countries (World Bank Human Capital Data Portal, 2026).

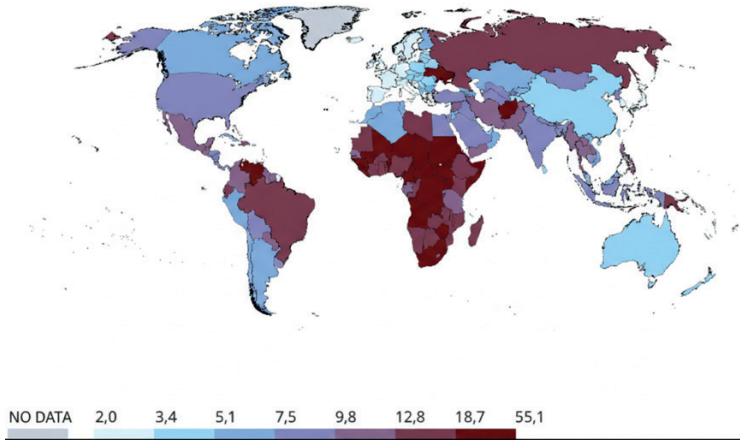


Figure 1. Global mortality rates among young adults aged 15-24 (Per 1 000)
(World Bank Human Capital Data Portal, 2026).

The youth population aged 15-24 in Türkiye is over 12 million, accounting for approximately 14.9% of the total population. Figure 2 shows Türkiye's youth population projection for 1950-2100, revealing a downward trend in the youth population ratio (Turkish Statistical Institute [TSI], 2024).

Young adult health is an important public health area that needs to be comprehensively addressed in the context of morbidities, risk factors, and risk groups. This period is a phase of intense psychosocial stressors, involving important life stages such as gaining economic independence, family-building processes, and career goals (Arnett, Robinson and Lachman, 2020). Health problems, risky behaviors, and habits that may emerge during this period can lead to significant long-term consequences, such as a decline in individuals' quality of life, loss of workforce, and an increased burden on the healthcare system. The fact that noncommunicable diseases are first observed during this

period highlights the importance of young adulthood in terms of the timing of interventions (Rod et al., 2025).

The main objective of this review is to address health problems with high prevalence in young adulthood within the framework of the public health nursing “risk approach” and to present interventions and solutions aimed at reducing existing risks from a public health nursing perspective.

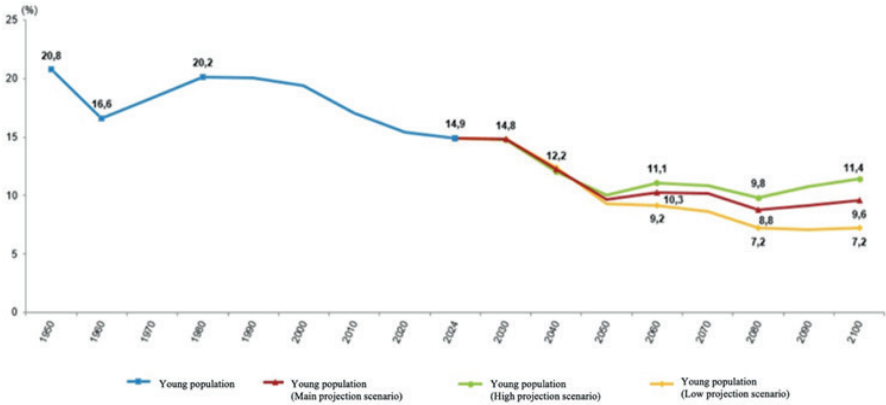


Figure 2. Proportion of the young population in the total population in Türkiye (1950–2100)

Life Changes as a Social Determinant of Health in Young Adulthood

The demands of the modern world and technological advances can cause changes in the stages of the life cycle in modern societies and can affect health both directly and indirectly. This period is a critical stage of life in which fundamental adult roles such as marriage, parenthood, and employment are assumed, and today, when and how these roles are assumed varies according to individual preferences and socio-cultural context (Pekel Uludağlı, 2017).

These life changes are considered risk factors that challenge an individual’s capacity to adapt and have the potential to affect their health. The scope of these changes and their effects on health are shown in Table 1 (Almeida et al., 2020; Bühler and Nikitin, 2020; Gerstorf et al., 2020; Hulus and Macdonald, 2020; Infurna, Gerstorf and Lachman, 2020).

Table 1. Life changes during young adulthood and their impact on health

Life Changes	Impact on Health
<i>Delayed adulthood</i>	Exposure to prolonged stress, economic instability, psychosocial risks.
<i>Changes in perceptions of family and reproduction</i>	Sexual health risks, loneliness, depression, reduced social support.
<i>Education and career process</i>	Chronic stress, burnout, work-life balance issues.
<i>Expansion of the caregiving role</i>	Role conflict, caregiving burden, neglect of self-care, psychosocial stress.
<i>Use of electronic media</i>	Digital isolation, sleep disorders, physical inactivity, obesity.

Delayed Adulthood

Delayed adulthood may be caused by the increase in the duration of education as a result of the rise in the level of education in society compared to previous years, leading individuals to start their working lives later. The prolongation of the education process increases exposure to stress and leads to increased uncertainty, economic stress, and psychosocial risks. All these reasons can indirectly affect individuals' health negatively (Almeida et al., 2020; Gerstorf et al., 2020).

Changes in Family and Reproduction Perceptions

It is emphasized that today's adults view marriage and parenthood as a choice rather than a necessity and build their reproductive choices accordingly. This situation can lead to new risks in fertility, sexual health, mental health, and social support systems. In particular, childlessness or late parenthood can affect individuals' social networks and life satisfaction, increasing the risk of loneliness and depression (Bühler and Nikitin, 2020).

Education and Academic Processes

The rise in educational levels over time can lead to increased daily stress and burnout. This situation brings to the fore issues such as job retention, stress management, and increased psychological risks among young adults with high educational levels (Almeida et al., 2020).

Expansion of the Caregiving Role

Increased life expectancy means that young adults are taking on more responsibility for caring for both children and the elderly. This brings with it various health risks, such as an increased caregiving burden, burnout, role conflict, neglecting one's own health, and increased psychosocial stress (Infurna et al., 2020).

Use of electronic media

It is emphasized that the increasing use of electronic media today reduces face-to-face social relationships and increases the risk of digital loneliness. This situation triggers public health problems such as sleep problems, physical inactivity (and the associated increased risk of obesity and cardiovascular disease), stress, and social isolation in young adults (Hulur and Macdonald, 2020).

Priority Health Issues in Young Adulthood

Young adulthood is a critical life stage when risky health behaviors that began in adolescence become entrenched and have the potential to impact long-term health outcomes. A significant portion of the morbidity and mortality burden during this period stems from modifiable risky behaviors (smoking, alcohol and substance use, risky sexual behaviors, violence-related injuries, etc.) (Mahalik et al., 2013). According to WHO data, the health issues that should be prioritized globally during this period are accidents and injuries, violence, suicide, bullying, substance abuse, mental health issues, sexually transmitted infections, obesity, environmental health issues, unhealthy nutrition, and physical inactivity (WHO, 2024a).

Accidents and Injuries

Accidents and injuries are among the most significant life-threatening problems frequently observed in young adulthood (WHO, 2024a). The risk factors for accidents and injuries are examined in three dimensions: incomplete developmental processes, individual-behavioral factors, and family and social factors.

Risk Factors for Accidents and Injuries

Developmental processes: In young adults, the developmental process of the prefrontal cortex (the center for decision-making and impulse control) and

temporal lobes in the brain is incomplete. This limits risk perception in young adults and increases their potential for harm (Gicquel et al., 2017).

Individual and behavioral risk factors: Low stress tolerance, inability to control emotions, anger, aggression, low self-esteem, depression, decreased attention and concentration, antisocial behaviors, risky attitudes (driving without a license, etc.), using a phone while driving (increases the risk of an accident by 3-4 times), excessive speeding tendency, thrill-seeking, competitive desire, higher speed obsession among males, violation of safe distance, stress, heavy alcohol consumption in a short period, alcohol and substance combination (increases accident risk by 15 times), and psychoactive substance use increase the risk of accidents and injuries among young adults (Gicquel et al., 2017).

Family and social risk factors: Weak parental supervision, overly permissive parenting attitudes, negative parental role modeling, parental unemployment, low socioeconomic status, ethnic origin, cultural factors, and peer influence increase the risk of accidents and injuries among young adults (Gicquel et al., 2017; Maya, Aviad, Tanya, Orna and Yossi, 2020; Martins and Mello-Jorge, 2013).

Violence

Violence is another factor that causes health problems in young adults. Violence is defined as any intentional behavior that arises from action (assault, etc.), intent (threat, etc.), or inaction (neglect, etc.) and aims to harm others or exert coercive control over them (Hamby, 2017). According to WHO data, a significant proportion of young adult deaths are violence-related. It is reported that firearm injuries, in particular, cause more fatal injuries than violence involving fists, kicks, stabbing, and blunt objects (WHO, 2024b). Types of violence can be classified in different ways, including sociological, psychological, political, economic, theological, and ontological contexts (Yener, 2023). Studies conducted with young people in Türkiye have reported high exposure to violence (Toplu-Demirtaş, Öztemür and Fincham, 2022). Emotional, physical, and sexual violence have been reported as the most common types of violence among young adults (Herbert et al., 2021).

Risk Factors for Violence

Individual risk factors: Anxiety, depression, loneliness, history of self-harm, adverse childhood experiences, history of sexual abuse, witnessing domestic violence, parental separation, male gender, aggressive behavior in childhood, anger, impulse control disorder, mood disorder, intense interest in

weapons/bombs/death themes, substance use, are individual risk factors for violence in young adults (Bushman, 2018; Herbert et al., 2021).

Environmental/social risk factors: Social exclusion, peer bullying, easy access to weapons, family characteristics (divorce, domestic violence, poverty, parental unemployment, parental involvement in crime), living in violent neighborhoods, violent movies/games/news, stressful life events, and school environment (crowded classrooms, high student-teacher ratio) are environmental/social risk factors for violence among young adults (Bushman, 2018).

Suicide

Suicide is one of the leading causes of death among young people aged 15 to 24 (CDC Wonder Online Database, 2026; Shankar, El Kady and Aggarwal, 2020). While the rate of suicide attempts is higher among young women than men, the rate of suicide resulting in death is higher among men than women (Miranda-Mendizabal, 2019).

Suicide Risk Factors

Individual risk factors: Gender, belonging to minority groups, loneliness, social isolation, sadness, hopelessness, low empathy, poor self-image, depression, anxiety, hyperactivity, history of suicide, eating disorder, sexual activity (high levels of sexual activity increase suicidal ideation) and a history of sexual/physical violence are individual risk factors for suicide in young adults (Cuesta et al., 2021; Shankar et al., 2020).

Family/Social risk factors: Family history (family history of suicide or mental health problems), socioeconomic status, single-parent family structure, domestic violence, poor communication within the family, low social support, and low parental supervision are family/social risk factors for suicide in young adults (Cuesta et al., 2021).

Substance Use

The age group with the highest rate of substance use is generally 18-25 years old. The risk of developing nicotine addiction and alcoholism is higher in this group than in adolescents (Alhammad et al., 2022). Since brain development continues at this age, substance use can have lasting negative effects on cognitive functions such as decision-making, attention, and emotion regulation. Young adulthood is a period of significant role transitions, such as gaining independence, starting college, and entering the workforce. These

transitions can increase stress and, consequently, the risk of substance use (Lu, Lopez-Castro and Vu, 2023; Patrick et al., 2020).

Risk Factors for Substance Use

Individual risk factors: Inability to cope with problems, stress, impulsivity, cognitive distortions, and co-occurring mental health disorders are individual risk factors for substance use in young adults (Hatz et al., 2025; Alhammad et al., 2022; Nawi et al., 2021).

Environmental and social risk factors: Peer influence, substance use by family members, societal norms, and accessibility of substances are environmental and social risk factors for substance use among young adults (Nawi et al., 2021; Kuppens, Moore, Gross, Lowthian, and Siddaway, 2020).

Mental Health Problems

The prevalence of mental illness among young adults aged 20-24 is twice as high as in younger age groups. Mental health problems are the most common cause of non-fatal disability among young adults aged 20-24. The high prevalence and disability burden among young people is a critical issue due to its potential for early chronicity and lifelong effects (Kieling et al., 2024).

Risk Factors for Mental Health Problems

Individual risk factors: Chronic illnesses, injuries, disability status, sleep problems, stressful life events, traumatic experiences, low self-esteem, suppression of emotions, low psychological resilience, academic stress, fear of failure, and suicidal ideation are individual risk factors for mental health problems in young adults (Sheldon et al., 2021).

Environmental and social risk factors: Inadequate parental support, negative parent-child relationships, social isolation, problems in friendships or romantic relationships, lack of social support, bullying, sexual abuse, discrimination, female gender, homosexual orientation, low socioeconomic status, financial worries, tobacco/alcohol/substance use, insufficient physical activity, irregular eating habits, prolonged screen time, and heavy workload are environmental and social risk factors for mental health problems in young adults (Sheldon et al., 2021).

Sexually Transmitted Infections (STIs)

STIs are one of the most common health problems among young adults aged 20-24. This group is 20 times more likely to encounter STIs than adults.

The most common types are HIV, HPV, chlamydia, and gonorrhea (Tao, Ghanem, Page, Gilliams and Tuddenham, 2020; Pflieger, Cook, Niccolai and Connell, 2013).

Risk Factors for Sexually Transmitted Infections

Sexual behaviors (number of partners, unprotected sex, etc.), low socioeconomic status, access to health services, immunization, alcohol and substance use, a history of STIs, and educational level are risk factors for STIs in young adults (Tao et al., 2020; Pflieger et al., 2013).

Obesity

The health and nutritional behaviors of young adults (aged 18-25) need to be improved. When modifiable factors are controlled, obesity and excess weight in young adults are preventable. In developing countries, the prevalence of obesity among young adults ranges from 2.3% to 12%, while the proportion of overweight individuals rises to 28% (Poobalan and Aucott, 2016; WHO, 2024a).

Obesity Risk Factors

Individual risk factors: Physical inactivity, consumption of fast food, processed foods, and sugary drinks, skipping breakfast, irregular eating, snacking, depression, stress, weight perception, not living at home, screen time, poor sleep quality, birth weight, rapid weight gain in early childhood, smoking, and alcohol use are individual risk factors for obesity in young adults (Poobalan and Aucott, 2016; Lee, Quek and Ramadas, 2023).

Psychosocial risk factors: High socioeconomic status, urban lifestyle, cultural perceptions (perception of being overweight as a sign of health and well-being), maternal nutrition during pregnancy, PTSD, and dietary habits determined by religious beliefs are psychosocial risk factors for obesity in young adults (Poobalan and Aucott, 2016).

Environmental Health Issues and Risk Factors

The majority of causes of death among young adults, including unintentional injuries and infectious diseases, are significantly related to the environment. Young people are at risk from environmental hazards and pollution due to their developmental physiology and immature systems. The main environmental hazards affecting the health of adolescents and young adults include air

pollution, the release of chemicals and heavy metals into the environment, climate change, and UV radiation (WHO, 2024a).

Internet Gaming Addiction

The global prevalence of internet gaming addiction, which harms the physical, psychological, and social health of adolescents and young adults, is reported to be 9.9%, while it is 10.4% among young adults alone (Gao, Wang and Dong, 2022).

Risk Factors for Internet Gaming Addiction

Stress, long gaming sessions, low academic achievement, being bullied, bullying others, experiencing problems in social relationships, ADHD, anxiety, depression, emotional distress, and low self-esteem are risk factors for internet gaming addiction in young adults (Gao et al., 2022).

Health Programs for Young Adults in Türkiye

The Turkish Ministry of Health, General Directorate of Public Health (GDPH), implements programs aimed at improving health specific to different stages of life. These programs cover infant and child health, adolescent health, adult (male/female) health, and elderly health (Ministry of Health, GDPH, Department of Child and Adolescent Health, 2025; Ministry of Health, GDPH, Department of Chronic Diseases and Elderly Health, 2025; Turkish Ministry of Health GDPH Healthy Nutrition and Active Life Directorate, 2025). When examining the scope of the programs, it is seen that the regulations on adolescent and adult health cover part of young adult health, but there is no program specifically designed for the young adult group. For example, the action plan titled “Action Plan for Combating Obesity and Physical Activity 2025-2028” developed by the Ministry of Health targets individuals aged 18 and over. Similarly, Figure 2 shows the vaccines recommended by the Turkish Ministry of Health for healthy and at-risk adults. Accordingly, the absence of the HPV vaccine, which can cause significant types of cancer, in the program is considered a major limitation for individuals who were not vaccinated during late childhood (Turkish Ministry of Health Vaccine Portal, 2025a). It is also noteworthy that HPV-related cancers are not included among vaccine-preventable diseases (Turkish Ministry of Health Vaccine Portal, 2025b).

Units affiliated with the Turkish Ministry of Health GDPH Cancer Directorate provide preventive cancer services as part of the fight against cancer in society and carry out various activities aimed at screening, monitoring, and raising public awareness. However, the fact that the most recent data available for

the unit is from 2021 makes it difficult to assess the current status of existing practices. Furthermore, upon reviewing the existing data, no health programs specifically tailored to cancer and targeting young adults, structured based on risks specific to life stages, were found (Turkish Ministry of Health GDPH Cancer Directorate, 2025).

Vaccines Recommended for Healthy Adults	Vaccines Recommended for Adults in Risk Groups
➤ Adult Tetanus-Diphtheria	➤ Hepatitis A
Pregnant Women	➤ Hepatitis B
➤ Adult Tetanus-Diphtheria, Acellular Pertussis	➤ Pneumococcus
➤ Adult Tetanus-Diphtheria	➤ Influenza
➤ Influenza	➤ Meningococcus
Aged 65 and Over	➤ Chickenpox
➤ Pneumococcus ➤ Influenza	➤ Measles, Rubella, Mumps

Figure 2. Vaccines recommended for adults

The program titled “Türkiye Diabetes Program 2023-2027,” developed by the Turkish Ministry of Health, recommends conducting diabetes screenings in adults over the age of 35. The same report emphasizes in the section “3.1.6. Type 2 Diabetes in Young People” that the incidence of diabetes in young people is increasing and that early-onset diabetes carries a higher risk of transmission between generations (Turkish Ministry of Health GDPH, 2023). However, no screening program specific to young adults has been identified.

The Turkish Ministry of Health GDPH Women’s and Reproductive Health Directorate has developed some programs for adults. For example, there are reproductive health programs, birth programs, high-risk pregnancy programs, premarital counseling, pregnancy education classes, 15-49 age group women’s monitoring programs, emergency obstetric programs, mother-friendly hospital programs, and cesarean section programs (Turkish Ministry of Health GDPH Women’s and Reproductive Health Directorate, 2025). However, these programs are aimed at all women and adults of reproductive age.

Healthy Life Centers (HLC) were established in 2017 to support access to primary health care services in Turkey and to facilitate access to these services.

HLCs offer various education and counseling services aimed at improving and maintaining health, free of charge to the entire community. For example, nutrition counseling, chronic disease and physical activity counseling, women's and reproductive health counseling, Cancer early diagnosis, screening, and education center counseling, mental health counseling, child and adolescent health counseling, tobacco and substance abuse counseling, infection control services, other medical services, and preventive oral and dental health counseling are some of these services. According to official figures in Türkiye, as of January 2026, there are 338 HLCs (Turkish Ministry of Health Healthy Life Centers, 2024). It is considered extremely necessary to ensure the participation of the young adult population in the health services provided at existing HLCs.

Primary health care services are largely provided through family health centers (FHCs). However, due to various structural and functional reasons, FHCs are unable to provide the full range of comprehensive services offered by community health centers (CHCs) and HLCs. This situation may lead to insufficient fulfillment of the needs specific to young adults' health problems. Therefore, developing programs focused on the health needs of young adults and creating strategic plans to support these programs is considered an important requirement. Furthermore, ensuring systematic integration between HLC and FHC is of great importance to increase the effectiveness of this process. Furthermore, employing public health nurses, who play important roles in protecting and improving individual, family, and community health, in HLCs can be considered a strong strategic approach. The active participation of public health nurses in assessing social determinants affecting the health of young adults and in health education and counseling processes is an important and necessary approach to improving the quality and efficiency of primary care services.

Youth health, which has not yet been comprehensively addressed in Türkiye, has become a topic that international organizations are working on and that is gaining prominence over time. The WHO Regional Director for Europe established the "Youth4Health" network to highlight health and well-being issues affecting young people, to enable young people to express their views on their own health, and to engage with them. Meanwhile, the Youth Health Organization International has identified four main policy/strategic priorities for youth health. These are: alcohol, tobacco, and substance use; nutrition and physical activity; environmental health and climate change; and mental health. It continues to work in collaboration with various organizations to improve youth health in these areas (Youth Health Organization International, 2022). Similarly, the Irish National Youth Strategy (2015-2020) targets the adoption of a healthy lifestyle that supports the physical, mental, sexual, and

well-being of young people as its first priority area, and various programs have been developed in this direction (National Youth Council of Ireland, 2019).

Young adulthood is a special period with different needs than other stages of life. Therefore, it is necessary to develop strategic plans tailored to the health needs of young people. It is believed that Türkiye needs specific health policies to protect and improve the health of young adults. Developing health policies specific to young adults can increase cost-effectiveness and reduce the burden of health problems that may arise in adulthood.

Public Health Nursing Activity Recommendations Using a Risk Approach

Young adulthood is an important life stage characterized by intense biopsychosocial changes and the emergence of health risks. Behavioral, environmental, and social risk factors and health problems that arise during this period can pose long-term threats to health. The risk approach is a proactive approach that focuses on identifying problems before they arise and preventing risks. In this context, public health nursing plays an important role in assessing risk factors and planning preventive interventions. Public health nurses' risk approaches to young adult health are addressed within the framework of comprehensive activities carried out at the primary, secondary, and tertiary levels of protection.

Primary Prevention Level Activity Recommendations

- Educational programs should be developed to increase health literacy among young adults.

- Campaigns should be developed to increase risk awareness regarding risky health behaviors and habits.

- School/university/workplace-based health education should be planned (mental health protection and awareness, coping with stress, problem solving, internet addiction and risks, healthy eating, STI risks, accident and injury prevention).

- Immunization programs should be implemented (especially information about the HPV vaccine).

- Community-based physical activity projects should be developed (walking groups, sports events).

- Awareness seminars should be organized to increase social media literacy and prevent digital addictions.

- Road safety and accident prevention training should be organized (traffic awareness, effects of alcohol and drugs, seat belt use).

- Counseling and training should be provided to the families of young adults (communication with young adults, the importance of parental support, information about the characteristics of this period) (Daniels, Hoosen and Pharaoh 2024; Wan et al., 2024; Yilmazel, 2023; Stormshak et al., 2019).

Secondary Prevention Level Activity Recommendations

- School/university/workplace-based mental health screenings should be conducted and necessary referrals provided.

- Regular STI screening should be conducted among young adults, and necessary counseling services should be provided for at-risk groups.

- Individual nutrition, weight changes, body mass index, and obesity risk should be monitored.

- The frequency of tobacco, alcohol, and substance use among young adults should be monitored.

- Individual counseling and necessary referrals should be provided for risky behaviors identified early in young adults.

- Young adults with a history of accidents and injuries or who are prone to violence should be assessed for potential new risks and referred to necessary support services.

- Early warning systems specific to young adults with mental health problems and suicide risk should be developed (Karcher et al., 2023; WHO, 2020; Chien, Chuang and Chen, 2020; Goodyear-Smith et al., 2017; Ozer, Urquhart, Brindis, Park and Irwin 2012).

Tertiary Prevention Level Activity Recommendations

- Rehabilitation programs should be created for young adults with mental health issues, behavioral/substance addiction, obesity, or STI diagnoses, and protection and prevention activities should be carried out for secondary risks that may threaten their health.

- Psychosocial support groups specific to young adults should be created.

- Programs should be developed to strengthen young adults' family and social support networks.

-Young adults with chronic illnesses should be monitored, their adherence to treatment should be supported, and advocacy should be carried out to ensure that their unmet needs are met by the state.

-Young adults at risk of reattempting suicide or relapsing into substance use should be continuously monitored, and follow-up systems should be developed.

-Young adults with barriers to accessing health services should be supported in accessing relevant social support programs, and individuals should be referred to these programs (Latimore et al., 2023; Karcher et al., 2023; Çalikuşu, Usluer and Tanriverdi 2023).

Conclusion

Health problems in young adulthood are a significant public health issue due to the prevalence of preventable risk factors, long-term health outcomes, and the potential for premature death and lifelong health loss. It is believed that health policies and programs specifically targeting young adults are limited in Türkiye. Public health nurses should be aware of young adulthood health issues and risks and should take on a role in developing and implementing intervention programs for these health issues.

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CHAPTER 4

FINGERTIP CARE: MOBILE APPLICATION AND ITS USE IN THE CARE OF PATIENTS WITH EATING DISORDERS

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Abstract

Eating disorders are considered one of the most serious types of mental illnesses. Characterized by persistent and severe disturbances in eating behaviors, distressing emotions and thoughts, the physical and psychological symptoms of eating disorders contribute to high mortality rates and an estimated 3.3 million healthy years lost worldwide each year. Despite the association of eating disorders with an increased risk of death and the existence of effective evidence-based treatments for their prevention and management, many individuals do not receive adequate care. Barriers such as long waiting lists, remoteness from healthcare facilities, financial constraints, shame, stigma, and low mental health literacy prevent patients with eating disorders from seeking treatment.

Mental health apps are widely used to access support for a variety of disorders and can significantly increase access to mental health services. The benefits of mental health apps can be particularly strong for individuals with

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eating disorders who lack the motivation to seek professional services or who discontinue traditional treatments early. Mental health apps can offer options that overcome some of the financial barriers, planning and transportation difficulties, and stigma associated with traditional services. Recent research highlights the increasing interest in smartphone-based intervention and monitoring tools among individuals with eating disorders.

Globally, there are a limited number of mental health mobile applications developed specifically for psychiatric nursing services. However, many mobile applications used in the field of mental health can also be used by psychiatric nurses. In Turkey, the number of mobile applications developed in the field of mental health is limited, and there is no mobile application developed specifically for psychiatric nursing services. It is believed that developing mobile applications for psychiatric nursing services and conducting evidence-based research are important for improving the quality of preventive, curative, and rehabilitative mental health services and enhancing mental health literacy in the community in Turkey. Furthermore, it is thought that psychiatric nurses, with their knowledge and experience, can lead the design and use process of mobile applications and can be pioneers in supporting patients in using mobile applications.

Keywords: Nursing, Mobile Application, Eating Disorder.

1. Introduction

Eating disorders are considered one of the most serious types of mental illnesses. Characterized by persistent and severe disturbances in eating behaviors, distressing emotions and thoughts, the physical and psychological symptoms of eating disorders contribute to high mortality rates and an estimated 3.3 million healthy years lost worldwide each year (Hart et al., 2020; Van Hoeken and Hoek, 2020). The diagnosis of eating disorders (ED) transcends cultural, racial, ethnic, socioeconomic, gender, and age boundaries (Udo and Grilo, 2018).

Patients with eating disorders were particularly severely affected by the COVID-19 pandemic. In 2021, there was a 15.3% increase in diagnoses of eating disorders, as well as a significant increase in hospitalizations for previously diagnosed patients (Lin et al., 2021). Pandemic-related social isolation and triggering factors increased psychological distress in individuals with eating disorders, weakening treatment response and increasing the likelihood of relapse during recovery (Baenas et al., 2020).

Given the increasing frequency, severity, and disease burden of eating disorders, there is a need to raise awareness about these disorders. In this context, nurses play a crucial role in the early diagnosis, appropriate referral, and holistic care of individuals with eating disorders (Cole, 2024).

2. Eating Disorders And Mobile Application

Eating disorders are complex psychiatric conditions associated with serious medical complications, a high degree of comorbidity with other mental disorders (e.g., substance abuse, depression, anxiety), and significant treatment costs (Hambleton et al., 2022; Samnaliev et al., 2015). These disorders involve significant disturbances in eating behaviors, including dietary restriction, binge eating, and compensatory behaviors, as well as increased concern about body shape and weight (Cruz et al., 2025). Despite the association of eating disorders with an increased risk of death and the availability of effective evidence-based treatments for their prevention and management, many individuals do not receive adequate care. Barriers such as long waiting lists, remoteness from healthcare facilities, financial constraints, shame, stigma, and low mental health literacy prevent patients with eating disorders from seeking treatment (Van Hoeken and Hoek, 2020; Cruz et al., 2025; Harrer et al., 2020).

Since the introduction of mobile phones in 2007, the development of mobile applications in healthcare settings has rapidly increased. By 2017, more than 325,000 healthcare applications were available to the large mobile phone user population worldwide (Lindgreen et al., 2018). In parallel, “hybrid” treatment, a mixture of digital tools and traditional face-to-face treatment, has become more common, although it has received relatively little research (Van der Vaart et al., 2014). In many countries, digitized healthcare is being policy-promoted as it is expected to provide various benefits, such as wider geographic reach and reduced costs (Lindgreen et al., 2018).

Mental health apps are widely used to access support for a variety of disorders and can significantly improve access to mental health services (Fairburn and Patel, 2017). The benefits of mental health apps can be particularly strong for individuals with eating disorders who lack the motivation to seek professional services or who discontinue traditional treatments early. Mental health apps can offer options that overcome some of the financial barriers, planning and transportation difficulties, and stigma associated with traditional services. Mental health apps for eating disorders also have significant drawbacks (Fairburn and Rothwell, 2015). Mobile app interventions have the potential to improve care by offering prevention and early intervention services, expanding

access to self-help treatments, and providing tools that help people maintain treatment gains and prevent relapse (Wasil et al., 2021).

Although significant progress has been made in developing valid measurement and diagnostic tools, guidelines for clinical care pathways, and evidence-based interventions, the vast majority of individuals with eating disorders remain undetected and untreated (Weissman and Rosselli, 2017). Financial and geographical barriers, as well as a shortage of qualified mental health professionals who can provide appropriate diagnostic assessments, case formulations, or treatment plans, remain significant factors. This can lead to limited access to services, long waiting lists, and delays in interventions, worsening the prognosis of the disorder (Kazdin et al., 2017). Therefore, there is a need for innovative solutions that can increase the accessibility of services and ensure that everyone affected receives timely and appropriate support (Linardon et al., 2022).

Individuals with eating disorders represent a population that could benefit from smartphone app-based intervention and monitoring tools, given that the ego-compliant nature of such disorders often leads to resistance to change (Linardon and Torous, 2025). The apps also enhance a sense of autonomy and control over the treatment process by allowing individuals to participate in treatment at their own pace (Torous et al., 2019). The scalability, flexibility, and affordability of the apps position them as promising tools for overcoming barriers to accessing traditional clinical services (Linardon and Torous, 2025). Recent research highlights the increasing interest in smartphone-based intervention and monitoring tools among individuals with eating disorders (Cruz et al., 2025; Linardon and Torous, 2025; Torous et al., 2019; Anderson et al., 2024; Liu and Linardon, 2025).

With smartphone usage approaching 90% worldwide and internet access now more prevalent via smartphones than computers, the scalability of smartphone tools is impressive. Studies show that some individuals prefer digital tools over traditional face-to-face options, particularly for managing symptoms and monitoring progress outside of formal therapy (Linardon and Torous, 2025; Anderson et al., 2024). Similar trends have been observed among clinicians, with many indicating openness to using apps in addition to treatment to facilitate inter-session interaction (Liu and Linardon, 2025). These findings demonstrate a certain level of interest in and acceptance of smartphone technology among individuals with eating disorders, highlighting its potential to enrich traditional treatment approaches and broaden access to additional support options (Linardon and Torous, 2025).

In practice, smartphones are already being used in various phases of eating disorder treatment. As self-management tools, apps can support individuals in monitoring their symptoms, developing coping strategies, and reinforcing healthy behaviors between or outside of therapy sessions. Smartphones are also being integrated into traditional treatment frameworks. For example, patients can use apps alongside psychotherapy to improve adherence to treatment plans, complete assignments, or record their emotions and behaviors in real time, allowing for more targeted therapeutic interviews (Liu and Linardon, 2025). Follow-up therapy is a promising application that helps prevent relapse with apps providing continuous access to resources and monitoring after discharge from intensive treatment (Neumayr et al., 2019). Emerging blended care models have begun to utilize smartphone data to guide clinicians' actions. In these models, real-time passive and active data streams alert healthcare providers to early signs of symptom worsening, encouraging timely intervention (Macrynika et al., 2025). These examples illustrate the evolving role of smartphone technology as both an independent and supportive resource in the continuity of eating disorder care (Linardon and Torous, 2025). In practice, smartphones are already being used at various stages of eating disorder treatment. As self-management tools, apps can support individuals in monitoring their symptoms, developing coping strategies, and reinforcing healthy behaviors between or outside of therapy sessions. Smartphones are also being integrated into traditional treatment frameworks. For example, patients can use apps alongside psychotherapy to improve adherence to treatment plans, complete assignments, or record their emotions and behaviors in real time, allowing for more targeted therapeutic interviews (Liu and Linardon, 2025). Follow-up care is a promising application that helps prevent relapse with apps providing continuous access to resources and monitoring after discharge from intensive treatment (Neumayr et al., 2019). Emerging blended care models have begun to utilize smartphone data to guide clinicians' actions. In these models, real-time passive and active data streams alert healthcare providers to early signs of symptom worsening, promoting timely intervention (Macrynika et al., 2025). These examples illustrate the evolving role of smartphone technology as both an independent and supportive resource in the continuity of eating disorder care (Linardon and Torous, 2025).

2.1. Mobile Applications Used in Eating Disorders

Recovery Record: An App for Managing Eating Disorders

Recovery Record (RR) is an example of a self-monitoring application for eating disorder management. It functions as a self-management tool or as part of a treatment where clinicians utilize the application's clinician interface. Similar

to recognized eating disorder treatment regimens, RR posts daily questions about the user's meals, behaviors, emotions, and thoughts (Tregarthen et al., 2015). It also includes nudge features such as meal reminders and affirmations following meal journaling, encouraging users to monitor themselves and eat regularly (Tregarthen et al., 2015). RR also incorporates other novel features such as personalized goals and coping strategies, and in-app meal photos aimed at increasing user motivation to adhere to the application and standard clinical recommendations. RR also incorporates gamification, meaning game-like principles in a non-game-like environment (Lindgreen et al., 2018). In RR, users are rewarded with a puzzle piece for each meal journal entry, eventually resulting in a complete puzzle linking to a song of their preferred genre. When used in a treatment program, RR allows for patient-clinician in-app connectivity, enabling clinicians to monitor patients' app data between treatment sessions and provide in-app notifications to patients when logs are reviewed (Tregarthen et al., 2015). Connectivity also allows for direct patient-clinician in-app messaging. Furthermore, RR can improve patient adherence to eating disorder treatment, including self-monitoring activities, due to its customizable features and digital format, which individuals tend to prefer over self-monitoring with pen and paper. Finally, patients may prefer in-app meal logging as it is likely to be more discreet than pen and paper (Lindgreen et al., 2018).

MI-Coach: ED Application

MI-Coach, created by Resiliens Inc., is a personal development app targeting motivation for health behavior change (e.g., exercising, quitting smoking, and sleep hygiene) and is widely available on both the Apple and Android app stores. MI-Coach's content has been adapted to a population with eating disorders. The latest adapted MI-Coach: ED app consists of seven modules targeting motivation to engage in eating disorder recovery behaviors (e.g., seeking help, exploring values, and self-acceptance). It addresses, in order, ambivalence and behavior change, self-acceptance and compassionate motivation, exploring potential behavior change goals, maintaining and modifying them, commitment language, and relapse prevention (Halicki-Asakawa et al., 2025).

Balance Application

The BALANCE app was developed to provide real-time, dialectical behavior therapy-based distress tolerance strategies that can be integrated into family-based therapy. BALANCE includes various features designed to increase stress tolerance in adolescents. Users can select a stress tolerance skill, such as distraction, relaxation, or emotion tracking, through the app's interface. Data on app usage (e.g., frequency, duration, and skill type) is collected. The

app also includes a gamification feature that rewards users with tokens (e.g., for customizing an avatar) based on their interactions. The app can be opened directly at the request of adolescents or their parents. Furthermore, when integrated with the user's personal smartwatch, notifications are sent to the user and they are prompted to open the app when their heart rate increases enough to indicate the possibility of emotional distress. Therapists working with adolescents in family-based therapy can access a dashboard providing visual charts and figures about adolescents' app usage. Therapists can integrate this information (e.g., how often the app is used, what time of day app use occurs, and which app features are accessed) into family-based therapy when working with patients and their families (Miranda et al., 2025).

TCAApp Application

TCAApp is specifically developed for individuals with eating disorders, is based on the principles of Cognitive Behavioral Therapy (CBT), and provides a two-way connection between patient and therapist. TCAApp is a tool for connecting patients and therapists during the time between medical consultations. It is currently available on Google Play and the Apple Store. Using TCAApp, patients and therapists are in constant communication, which allows the therapist to respond more quickly to the patients' needs (Anastasiadou et al., 2018).

Through TCAApp, patients can record their thoughts, actions, emotions, and anything else that therapists deem important for therapy, as the application can be customized to each patient's therapy needs. The application includes AI-based algorithms that can generate alarms when strategic words (e.g., suicide, death, etc.) are entered. It also offers technologies that enable real-time online communication with therapists and a gamification approach with rewards and reminders to increase patient engagement. The background tool for therapists is a web-based platform where therapists can see what their patients are recording in real time (i.e., generating graphs over a specific period to compare parameters and see patient progress) and interact with them in real-time using PUSH notifications (Anastasiadou et al., 2018).

Mobile Mental Health Game: Maze Out

Maze Out is a digital game playable on Android tablets or smartphones, designed as a maze. The goal of the game is to escape the maze and reach the desired life. This desired life isn't presented to the player as something tangible and specific to the game; rather, it's a metaphor inviting the player to connect with their own dreams and desires. While playing, players are presented with various scenarios and choices representing daily life. To find their way out,

they must complete 10 tasks within the maze. These tasks reflect different themes embedded in the game; these include challenges related not only to food and exercise, but also to emotions, relationships, and communication (Guala et al., 2023).

While playing Maze Out, players are asked to engage in thought exercises and cope with challenges on their journey, helping them relate the game's content to their daily lives. The challenges change as players progress through more psychologically demanding situations, becoming more metaphorical and emphasizing complex psychological processes such as setting boundaries, making autonomous decisions, and managing emotions (Guala et al., 2023).

2.2. Patient and Clinician Opinions Regarding Mobile Applications for Eating Disorders

Mobile applications are considered to play a significant role in the management of eating disorders. By enabling effective on-site monitoring of thoughts, feelings, and behaviors, mobile applications offer valuable insights into the nature of symptoms and the factors influencing them (Faurholt-Jepsen et al., 2020). Applications can also host 24/7 accessible intervention resources and programs and provide personalized treatment recommendations in real-time based on end-user feedback, progress, and effectiveness (Torous et al., 2021). Studies have reported that eating disorder applications are effective as a standalone intervention option (Linardon et al., 2022; Tregarthen et al., 2019), as a tool accompanying web-based interventions, and in addition to traditional treatment services. Their scalability, flexibility, and affordability make application-based tools an attractive support option for individuals with eating disorders (Linardon et al., 2023; Hildebrandt et al., 2020).

A study aimed at understanding user experiences and preferences regarding digital interventions designed to reduce mild to moderate eating disorder symptoms in adults reported that users had positive experiences with digital interventions and perceived them as useful for self-reflection and awareness. Users also indicated that they found the digital interventions convenient, flexible, and compatible with their lifestyles. Overall, users reported a reduction in eating disorder thoughts and behaviors, but generally did not perceive digital interventions as sufficient replacements for traditional face-to-face treatment. The study also noted that users found digital interventions for eating disorders practical and effective, but stressed that interventions should encompass all symptoms, severity, and individual needs (Cheung et al., 2025). Similar studies have shown that the innovative care intervention was highly appreciated by patients and had the potential to support post-inpatient recovery (Schlegl et

al., 2024), and that the application was highly feasible and acceptable to users and clinicians, but raised concerns about the degree of personalization and customizability (Juarascio et al., 2015).

However, despite evidence showing that individuals with eating disorders are willing to include apps in their treatment plans, the widespread adoption and integration of apps into clinical practice remains limited (Linardon et al., 2021). Clinician knowledge, attitudes, and beliefs about apps can pose significant barriers to their adoption (Baumeister et al., 2020). For example, concerns about the safety and evidence-based nature of these apps can cause clinicians to hesitate, especially since current market offerings indicate limitations in data privacy protections and compliance with empirically supported strategies (Fairburn and Rothwell, 2015). Furthermore, a lack of training or familiarity with current technologies can also weaken clinicians' confidence in recommending apps to clients or the public (Wisniewski and Torous, 2020). Given that clinicians are trusted sources of information, it is noted that their perceptions and recommendations are likely to influence how readily these apps are adopted by individuals seeking help. Alternatively, beliefs that apps could replace face-to-face care or disrupt established therapeutic relationships may also lead clinicians to be more cautious in adopting them. However, despite the clinical benefits of apps, clinicians' perspectives on integrating them into eating disorder treatment are unknown. By understanding clinician practices and perspectives, it becomes possible to address barriers or misunderstandings, increase trust in mobile health apps, and support the development of technological innovations aligned with clinical standards and workflows. When these efforts are combined, they can facilitate the wider adoption and integration of mobile apps into clinical practice (Liu and Linardon, 2025).

A study aimed at understanding mental health professionals' practices and perspectives on eating disorder interventions reported that approximately two-thirds (63%) of mental health professionals used/discussed interventions with their clients. The most common reasons for use included the fact that interventions complement their services and are effective methods for monitoring symptoms and progression. The most common reason given by clinicians who did not use/discuss interventions with their clients was a lack of knowledge about which interventions were appropriate to recommend. The study also reported that approximately 50% of clinicians had little or no knowledge of existing eating disorder interventions and felt limited confidence in effectively using them in practice. However, eight out of ten clinicians were open to incorporating interventions into treatment, and most agreed that interventions could be beneficial in terms of psychoeducation,

skill development, relapse prevention, and providing support when access to other help options is limited. Overall, the findings indicate that mental health professionals are excited about the potential of these practices in managing eating disorders, but there are still significant barriers to their adoption and integration into practice (Liu and Linardon, 2025).

3. The Role Of Psychiatric Nurses In Eating Disorders

Diagnosing eating disorders can be challenging in the early stages, when treatment is most effective. Routine screenings for body image, mental health, height, weight, and body mass index (BMI) can improve treatment outcomes by identifying early-stage eating disorders (Dooley-Hash et al., 2019; Hornberger et al., 2021; Owens et al., 2023). For individuals diagnosed with eating disorders, nurses' ability to take a comprehensive history by recognizing physiological cues significantly impacts understanding patients' anxieties. While one or two symptoms alone may not indicate the presence of an eating disorder, nurses can identify common assessment findings or concerning patterns. By communicating these concerns to the healthcare team, nurses play a crucial role in referral and treatment. Additionally, nurses are providers of long-term follow-up and support necessary for recovery in primary care settings (Hornberger et al., 2021; Johns et al., 2019).

Treatment of eating disorders is complex and requires an interdisciplinary approach. Treatment goals focus on weight gain for anorexia nervosa, normalization of eating and exercise behaviors for all eating disorders, and treatment of underlying mental health issues (Guarda and Attia, 2018; Hage et al., 2015). Treatment methods include psychotherapy, medications, nutritional counseling, weight gain monitoring, family therapy, interpersonal support, and medical monitoring. Following inpatient treatment, most patients require comprehensive outpatient care and monitoring, including daily hospital stays. Nurses are at the intersection of this spectrum of care in the management of eating disorders. Therefore, the nurse's role in the treatment and recovery process is important (Cole, 2024).

Many patients with eating disorders initially require medical stabilization in an inpatient setting as a prerequisite for successfully initiating psychotherapy. Addressing both medical and psychological issues during medical stabilization necessitates practitioners who possess understanding, sensitivity, and knowledge of eating disorders and are aware of the patients' multidisciplinary needs (Owens et al., 2023; Johns et al., 2019; Salzmänn-Erikson and Dahlén, 2017). Medical stabilization typically focuses on behavioral interventions such as restoring

nutrition, preventing refeeding syndrome (a dangerous metabolic syndrome that can arise from re-introducing nutrition after prolonged malnutrition), managing electrolyte imbalances and other laboratory values, dietary planning, psychiatric care, and professional support (Hornberger et al., 2021; Owens et al., 2023; Cioffi et al., 2021).

Following medical stabilization, treatment for eating disorders involves individualized plans requiring an interdisciplinary approach. Multifaceted evidence-based care includes medical management and pharmacotherapy; psychotherapy, nutritional counseling; meal planning and support; and emotional, social, and personal support. Psychotherapy treatments vary depending on the type of eating disorder and include cognitive behavioral therapy, family-based therapy, acceptance and commitment therapy, interpersonal psychotherapy, and dialectical behavioral therapy (Hornberger et al., 2021; Guarda and Attia, 2018). Supportive therapies such as mindfulness, art, and meditation can also be helpful (Owens et al., 2023). Treatment should include recovery and improvement, encompassing physical, psychological, and social development (Johns et al., 2019; Corral-Liria et al., 2022). Adherence to evidence-based treatment and protocols in guided programs can improve outcomes for individuals diagnosed with eating disorders and reduce the likelihood of relapse. Nurses have important roles and responsibilities in these care settings and require specialized training and certification in caring for and supporting individuals diagnosed with eating disorders (Guarda and Attia, 2018; Salzmänn-Erikson and Dahlén, 2017; Corral-Liria et al., 2022).

Establishing a therapeutic relationship is vital for providing care to individuals diagnosed with eating disorders. When healthcare professionals fail to provide care that includes sensitivity, empathy, and understanding of the complexity of eating disorders, patients and their families may face barriers to accessing care (Johns et al., 2019). Patients often perceive healthcare professionals as weak and lacking motivation (Salzmänn-Erikson and Dahlén, 2017). Caring for individuals with eating disorders can be demanding for healthcare professionals because it requires sensitive care. Establishing a relationship of mutual cooperation, openness, honesty, and trust free from judgment between the individual diagnosed with an eating disorder and the healthcare professional is vital for strengthening and encouraging hope and recovery (Owens et al., 2023; Hage et al., 2015; Salzmänn-Erikson and Dahlén, 2017; Corral-Liria et al., 2022).

4. The Use Of Mobile Applications In Psychiatric Nursing

A psychiatric nurse is a mental health professional who can provide health education and counseling in maintaining mental health, understand the psychological state and evaluate the behavior of healthy or sick individuals, possess a high ability to comprehend psychological needs, provide necessary care, guidance, rehabilitation and support to the patient, have knowledge and skills in interpersonal relationships, and provide care using nursing roles in line with theories and research findings (Arslan and Erfidan, 2024).

Psychiatric nurses have roles and responsibilities such as assessing patients mentally and physically, coordinating holistic care for evidence-based interventions for patients, observing, empathizing, actively listening, ensuring social acceptance of patients and preventing stigma, helping patients initiate and maintain social relationships, and ensuring their participation in care (Arslan and Erfidan, 2024).

The use of mobile applications in mental health nursing care services frequently includes assessing a patient's care needs, planning and implementing interventions, making recommendations, assigning homework, and monitoring progress (Kaipainen et al., 2017). Mobile applications allow for quick and detailed access to patient data and enable more time to be dedicated to patients; they can improve the quality of mental health nursing care by facilitating individualized care, treatment, and follow-up management (Kaipainen et al., 2017; Kaas, 2020; Finnell et al., 2014). These applications also offer opportunities such as providing skills training, developing awareness and social skills, providing social support, and improving symptom monitoring and management skills (Kim et al., 2016).

In addition to the limited number of mobile applications developed for psychiatric nursing services in the literature, psychiatric nurses can also use mental health mobile applications that define mental state, perform behavioral and activity analysis, manage daily functions, remind appointments and medication use, develop individual awareness, support symptom management, and inform the healthcare team about the patient's condition by recording data in real time; and that contain many features such as psychoeducation, stress management, addressing cognitive distortions, motivational interviewing, homework tracking, creating a healthy lifestyle, early diagnosis of disease symptoms and managing symptoms (Kaas, 2020; Basavarajappa and Chand, 2017; Engel et al., 2015; Elias et al., 2014; Mohr et al., 2017).

Mental health mobile applications are used in mental health clinics and community mental health services for emergency crisis response, prevention, diagnosis, primary treatment, support for face-to-face therapy, and post-treatment status management (Price et al., 2014). Mobile applications are frequently available for the prevention, treatment, and rehabilitation of many disorders such as autism, anxiety, depression, schizophrenia, attention deficit hyperactivity disorder, and Alzheimer's disease (Aitken and Lyle, 2015).

As an example of a mental health mobile application developed for use in eating disorders by psychiatric nurses, a real experimental study with a pre-test-post-test control group design was conducted in Kendari, Southeast Sulawesi province, Indonesia, to evaluate the effectiveness of self-help intervention in addressing eating disorders and improving mental health among children and adolescents. The study reported that self-help intervention was effective in reducing the risk of eating disorders and improving mental health among adolescents. The study indicated that this approach is a promising, cost-effective, and accessible strategy for integration into nursing practice (Purnamasari et al., 2025).

5. Conclusion

There are a limited number of mental health mobile applications developed specifically for psychiatric nursing services worldwide. However, many mobile applications used in the field of mental health can also be used by psychiatric nurses (Arslan and Erfidan, 2024; Purnamasari et al., 2025). In Turkey, however, the number of mobile applications developed in the field of mental health is limited, and there is no mobile application developed specifically for psychiatric nursing services (Arslan and Erfidan, 2024).

In Turkey, it is considered important to develop mobile applications for psychiatric nursing services and conduct evidence-based research to improve the quality of preventive, curative, and rehabilitative mental health services and to enhance mental health literacy in society. Furthermore, it is believed that psychiatric nurses, with their knowledge and experience, can lead the design and use of mobile applications and can be pioneers in supporting patients in using these applications (Arslan and Erfidan, 2024).

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CHAPTER 5

AS TECHNOLOGY ADVANCES IN HEALTH CARE, IS ANXIETY ALSO INCREASING? PROFESSIONAL CONCERNS ABOUT ARTIFICIAL INTELLIGENCE

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Abstract

Rapid developments in artificial intelligence technologies are transforming the health sector, as they are many other fields. As artificial intelligence-based decision support systems, robotic applications, automation, information technologies, and data-driven models of care become increasingly integrated into health care services, students' perceptions of these technologies, their expectations regarding professional roles, and their confidence in the future are also being shaped by this transformation. The rapid incorporation of artificial intelligence into both clinical practice and the working dynamics of health professionals may trigger various forms of anxiety among students even before graduation, including uncertainty, fear of role loss, concerns about professional competence, and the perception that the human dimension of care may gradually diminish. In this context, anxiety related to artificial

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intelligence may be considered an important psychosocial factor influencing students' perceptions of professional self-efficacy, their confidence in their future professional roles, and the development of their professional identity. This process may adversely affect both academic performance and commitment to the profession. This review aims to shed light on the future of health care services by emphasizing the need for educational models that enhance awareness of artificial intelligence among health sciences students, curriculum arrangements that strengthen digital competence, and support mechanisms that reinforce students' professional identities.

Keywords: Artificial Intelligence, Professional Anxiety, Anxiety, Student, Health Sciences

Introduction

Health care services constitute a professional field characterized by a multidisciplinary and complex structure (Alowais et al., 2023). Technological advances in health care significantly influence the working processes of health professionals, ranging from the management of care processes to clinical decision-making mechanisms (Connor et al., 2022; Oleribe et al., 2025). In particular, the increasing use of applications such as artificial intelligence in diagnosis, treatment planning, patient monitoring, and data management has introduced a new process of transformation within health systems (Singh et al., 2025). Because health professionals remain in continuous interaction with patients and play an active role in clinical observation and decision-making processes, they are among the groups most affected by this ongoing and rapidly evolving technological transformation (Alowais et al., 2023).

The integration of many technological tools used in health care, especially artificial intelligence-supported systems, into human-centered fields such as nursing, midwifery, nutrition and dietetics, physiotherapy, occupational therapy, and health management offers important opportunities for reducing workload, improving the quality of care, and decreasing error rates. At the same time, however, this integration may also give rise to a range of concerns regarding the future of professional competencies, the possible reduction of human touch, and changes in professional role definitions (Güdük et al., 2025). Perceptions of technological innovation in health care are not limited to technical skills and competencies alone; they also affect health workers' perspectives on technology, levels of trust, and expectations regarding their professional future (Zhang et al., 2025). As digitalization accelerates in the health sector, it becomes increasingly necessary to evaluate whether health professionals are actively involved in this transformation and able to adapt

to it. This also highlights the need to redefine professional roles, strengthen technological competencies, and adapt to changing understandings of care (Alowais et al., 2023).

The acceleration of digital transformation in health care is of major importance not only for current health professionals but also for students who have not yet entered professional practice. It is essential that students both benefit effectively from technologies such as artificial intelligence during their education and prepare for possible concerns and knowledge gaps that may emerge through technology use in their future professional lives. Such preparation is necessary to support their adaptation and to ensure appropriate improvements in the educational process (El Arab et al., 2025). This chapter aims to highlight the need for educational models that will increase artificial intelligence awareness among all health sciences students, curricular arrangements that will strengthen digital competencies, and support mechanisms that will reinforce students' professional identities. It also seeks to offer recommendations for alleviating their concerns and to shed light on the future of health care services.

Artificial Intelligence and Digital Technologies in Health Care: Areas of Use and Opportunities

Artificial intelligence-supported systems in health technologies are being used effectively in critically important areas such as patient monitoring, data analysis, diagnosis and treatment planning, rehabilitation processes, and educational simulations (Alowais et al., 2023; Singh et al., 2025). These technologies present substantial opportunities in health care by reducing workload and improving the quality of care. Reporting the role of artificial intelligence in clinical settings is essential for its successful adoption because it provides medical and health professionals with the information and tools they need (Chen et al., 2022). Artificial intelligence increases accuracy in health care by minimizing human error, reducing costs, and saving time. It also has broad applications in transforming personalized medicine, optimizing medication dosages, improving population health management, developing clinical guidelines, and providing virtual health assistants. In addition, artificial intelligence can support mental health services, enhance patient education, and strengthen trust between patients and physicians, thereby contributing not only to the quality of care but also to the professional processes of health practitioners (Alowais et al., 2023; Dave and Patel, 2023; Oleribe et al., 2025).

Examples of beneficial artificial intelligence use also vary across disciplines. One study concluded that artificial intelligence may assist the learning process

of first-year medical students and that some artificial intelligence algorithms may perform at least as successfully as clinicians in terms of diagnostic accuracy (Xue et al., 2020). In nursing, artificial intelligence applications encompass a wide spectrum ranging from predictive analytics and clinical decision support systems to web-based assistants and robotic care technologies. These technologies have the potential to reshape nursing care delivery and positively transform the ways in which nurses interact with patients (Ventura-Silva et al., 2024; Jiang et al., 2026). Furthermore, artificial intelligence-supported care recommendations can provide nurses with evidence-based information, enabling patients to receive the most appropriate care according to their individual needs. Likewise, artificial intelligence-supported virtual assistants and chatbots have the potential to increase patient engagement and education by providing accurate medical information, answering questions, and offering guidance during the post-discharge period. In this way, patients are empowered through knowledge, while nurses are better able to support patient autonomy and well-being and focus on the more critical and complex aspects of care (Ahmed, 2024).

Artificial intelligence is also gaining increasing importance in midwifery, much as it is in nursing, through systems that detect risks early during pregnancy follow-up, algorithms that analyze fetal health, and intelligent technologies that monitor labor, all of which contribute to maternal and infant safety (Connor et al., 2022). Similarly, in nutrition and dietetics, the rapid advancement of health-related artificial intelligence and its integration into nutrition care carries substantial potential to improve individual nutritional outcomes, optimize dietary recommendations, and support patient recovery (Theodore Armand et al., 2024). In physiotherapy and occupational therapy, robotic supports and telerehabilitation applications contribute to improving patients' mobility while making therapeutic processes more precise and measurable (Tack et al., 2018). In health management, artificial intelligence-supported data analytics and process optimization offer intelligent and personalized interactions in areas such as chatbots, diagnosis, chronic disease management, and mental health support within digital health systems. In addition, predictive models that optimize resource use in hospital administration and quality improvement efforts provide decision-makers with a strong analytical infrastructure in managerial processes such as workforce planning, patient flow management, cost analysis, and the monitoring of quality indicators (Wah, 2025).

Beyond these applications, technology and artificial intelligence also create educational and adaptation opportunities for health professionals and students (Dave and Patel, 2023). One study reported that the mean artificial intelligence anxiety score among nurses was low; however, distributional analysis showed

that a considerable proportion of participants were in the moderate and high anxiety groups (Aydın and Kahraman, 2026). The same study also found significant differences in mean scores according to age, educational status, artificial intelligence use, and prior training related to artificial intelligence. At a time when the integration of artificial intelligence technologies into health care is accelerating, determining nurses' anxiety levels regarding this transformation is important for technology acceptance and effective use. Among nursing students, simulation applications and digital educational tools contribute to the development of clinical skills, the enhancement of professional awareness, and preparation for future professional roles (Klimova and Pikhart, 2025). A study comparing students' and faculty members' perceptions of artificial intelligence use likewise emphasized the importance of deliberate integration and the development of appropriate educational programs (Ostlick et al., 2025).

Overall, the use of artificial intelligence and digital technologies in health care not only improves the quality of patient care but also creates new opportunities for the professional development of health professionals and students. Nevertheless, the proper management of technological integration and the support of adaptation processes are critical for ensuring that these opportunities are used effectively (Cucci et al., 2025). Evaluating and monitoring the mental and emotional effects of students' interactions with artificial intelligence technologies can help educators and policy makers who shape curriculum development and support systems that integrate artificial intelligence into student learning to make evidence-based and effective decisions (Shahzad et al., 2024). Artificial intelligence offers important opportunities to improve nursing education in both academic and clinical settings, yet it must be approached with critical awareness and responsibility. To enable students to fully benefit from the potential of artificial intelligence while ensuring high-quality education and responsible nursing practice, both digital competencies and students' perceptions and behaviors should be closely monitored (Cucci et al., 2025).

Concerns of Students in Health Fields Regarding Artificial Intelligence

The growing use of artificial intelligence and digital technologies in health care has significant effects on professionals' perceptions of their roles and responsibilities. Although artificial intelligence offers advantages such as undertaking certain decision-making processes, reducing error rates, and decreasing workload, it also brings professional concerns (Arvai et al., 2025). In particular, the rapid incorporation of artificial intelligence technologies

into both clinical practice and the working dynamics of health professionals, alongside changing disease patterns and advancing technology, may trigger different types of concerns in students even before graduation, including uncertainty, fear of role loss, anxiety about competence, and the belief that human touch may diminish (Chen et al., 2022; Klimova and Pikhart, 2025). In this respect, anxiety related to artificial intelligence can be regarded as an important psychosocial variable that influences students' perceptions of professional self-efficacy, confidence in their future profession, and the development of their professional identity. This process may negatively affect both their academic performance and their commitment to the profession.

A study conducted among nursing students found that although students acknowledged the advantages of artificial intelligence, they also expressed concerns about its limitations and stated that they felt they lacked advanced technical understanding of the technology (Bakarman et al., 2025). Professionals in nursing, midwifery, nutrition, and other health disciplines may experience uncertainty regarding how their professional roles will be reshaped by technology. Students who have not yet entered professional life may therefore encounter both potential anxieties and gaps in knowledge during this period of transformation. In a study conducted at a university in Türkiye that examined health sciences students' anxiety and attitudes toward artificial intelligence, differences were observed among departments in both artificial intelligence anxiety and attitudes. According to Yabana Kiremit and colleagues, in their 2026 study, orthotics and prosthetics students had the highest positive attitude scores toward artificial intelligence, whereas nursing students had the highest levels of artificial intelligence anxiety. The study also found departmental differences in the learning and job anxiety subdimensions of artificial intelligence anxiety. Nursing students experienced the highest level of learning-related anxiety regarding artificial intelligence, whereas students in health management exhibited the highest level of job-change anxiety.

Another study examining the current state of the integration of artificial intelligence into medical practice and the concerns expressed by health professionals about its application found that health workers experienced a range of negative emotions toward medical artificial intelligence, extending from skepticism to intense fear (Arvai et al., 2025). In line with these findings, it has been suggested that overcoming resistance to medical artificial intelligence requires comprehensive education, the implementation of appropriate legislation, and clear role definitions (El Arab et al., 2025). Similarly, another study examining the effect of generative artificial intelligence literacy on self-directed learning skills among nursing and midwifery students reported that generative artificial intelligence literacy had a positive effect on general

attitudes toward artificial intelligence. However, the study also emphasized that these attitudes alone may not be sufficient to foster self-directed learning and that artificial intelligence education should therefore be incorporated into the curricula of health-related departments (Sengül et al., 2025).

According to the literature, other concerns associated with artificial intelligence include the loss of human touch and empathic approaches in patient care, algorithmic bias, ethical problems related to data privacy, and the risk of dependency arising from artificial intelligence use (Ahmed, 2024). More broadly, when professional concerns and anxieties are considered alongside the opportunities offered by technology, strategies are needed to ensure balanced integration in the educational and practical processes of both professionals and students. In one study that examined artificial intelligence literacy among health professions students as one such strategy, artificial intelligence literacy was found to significantly reduce technological stress and improve attitudes toward digital technology. The study also showed that technological stress had a negative effect on attitudes toward digital technology, that these relationships differed across departments, and that they were significant for medical and nursing students but not for dentistry students (Lee et al., 2026).

Professional Concerns and Perceptions of Artificial Intelligence Among Health Sciences Students

The increasingly widespread use of artificial intelligence and digital technologies in health care has generated a broad field of transformation extending from the working styles of health professionals to educational processes. Artificial intelligence applications used in many areas, including diagnosis, treatment, monitoring, data analysis, clinical decision support systems, and patient education, increase speed, accuracy, and efficiency in health service delivery (Dave and Patel, 2023; Singh et al., 2025). However, technological developments should not be regarded merely as technical innovations; because of the inherently human nature of health care services, they must also be considered in their professional, ethical, educational, and psychosocial dimensions (Oleribe et al., 2025). The integration of technologically advanced and artificial intelligence-supported systems into health care processes offers important advantages, particularly in reducing workload, decreasing error rates, and supporting evidence-based decision-making among health professionals (Alowais et al., 2023). Across many health disciplines, from nursing and midwifery to physiotherapy and nutrition and dietetics, these technologies have the potential to improve the quality of care (Connor et al., 2022; Theodore Armand et al., 2024; Tack et al., 2018). Yet,

alongside these opportunities, technology also brings certain professional concerns to the forefront (Arvai et al., 2025). In particular, there is growing attention to concerns that professional roles may change, human-centered care may weaken, clinical autonomy may decrease, and technological competence may become one of the main determinants of professional success.

Students in health-related educational programs experience various concerns regarding the integration of artificial intelligence and digital technologies into educational and clinical processes. Although the literature reveals general anxiety, uncertainty, and adaptation difficulties associated with technology use among students, studies that comprehensively address professional concerns remain limited (Chen et al., 2022; Kiremit et al., 2026). In addition, studies specifically focusing on the professional concerns related to artificial intelligence among all students in the health sciences are insufficient. Uncertainties regarding how future professional roles will be shaped by technology, the loss of autonomy in clinical decision-making, and perceptions of professional competence are all critically important dimensions for students, yet they have not been adequately explored. This gap increases the importance of identifying students' professional concerns at an early stage and integrating them into educational programs and support systems. Accordingly, future studies in this field are of great importance for increasing students' professional awareness and supporting their adaptation to artificial intelligence and digital technologies (Shahzade et al., 2024).

Anxiety experienced by health workers may lead to occupational accidents and work-related illnesses and may adversely affect physical, social, and psychological health in particular (Bayram, 2024). The literature indicates that, in systems where artificial intelligence is integrated, workers may feel that they are under surveillance and may therefore experience a loss of control and negative emotions. It has also been reported that increased interaction with artificial intelligence may lead to isolation and disconnection from non-robotic colleagues, and that when tasks are automated by artificial intelligence, individuals may perceive a reduction in their sense of meaning and purpose (El-Helaly, 2024). The systematic assessment of professional concerns is therefore of great importance for preparing students for their future roles as health professionals, improving educational programs, and effectively supporting adaptation to artificial intelligence and digital technologies.

A study that examined health workers' attitudes and anxieties regarding artificial intelligence in depth found that, although artificial intelligence contributed substantially to clinical decision-making and patient care, issues such as the role of technology in decision-making mechanisms, the protection

of patient privacy, and the reshaping of professional roles created various concerns among health workers. The study also emphasized that deficiencies in knowledge and competence related to artificial intelligence may act as limiting factors affecting effective use, professional adaptation, and performance (Enginyurt, 2025). These concerns are not limited to actively practicing health professionals. Students enrolled in faculties of health sciences may also think about the effects of this transformation before entering the profession and may experience various uncertainties regarding their future working lives (Yabana Kiremit et al., 2023).

A study examining nursing students' attitudes toward artificial intelligence and the role of personality traits in shaping those attitudes reported that nursing students displayed cautious optimism toward artificial intelligence, while personality traits and education played an important role in shaping their perceptions. The study concluded that integrating artificial intelligence into the nursing curriculum is important for increasing students' confidence in and willingness to adopt artificial intelligence in professional practice and for promoting the effective use of artificial intelligence technologies in health care services (Tsiara et al., 2025). Therefore, it is important that students be educated not only as individuals who can use technology, but also as future health professionals who are able to evaluate its professional implications.

Conclusions and Future Recommendations

The integration of artificial intelligence-supported systems into health care processes has facilitated the work of health professionals while also bringing certain concerns. This issue is important not only for professionals who are currently delivering health care services, but also for future health professionals who will work with these systems. For this reason, it is necessary to assess perceptions of technology, adaptation, and levels of professional anxiety beginning in the student years. Although the literature includes studies on students' general attitudes toward artificial intelligence, technology use, anxiety levels, and digital literacy, studies focusing directly on the dimension of professional anxiety remain limited. Yet the early identification of professional anxiety is important for updating educational content, strengthening student support systems, and grounding curriculum planning in scientific evidence. Educational strategies developed without identifying students' concerns may fail to achieve full adaptation to the process of technological transformation.

Looking ahead, strengthening artificial intelligence literacy in health education should be one of the primary priorities. It is recommended that curriculum content systematically incorporate topics such as artificial

intelligence, digital health applications, data management, ethical use, and clinical technology integration. In particular, interdisciplinary differences should be identified. Educational models should be developed to support nursing, midwifery, physiotherapy, nutrition, and health management students in building shared digital health awareness. In addition, students should be prepared for technological transformation not only at a theoretical level but also through practical experiences. Simulation laboratories, digital case analyses, artificial intelligence-supported clinical scenarios, and virtual patient applications may help students develop greater confidence in technology.

It may be expected that students who encounter technology early in the educational process will experience lower levels of professional anxiety and stronger clinical adaptation. From the perspective of health institutions, future policies on artificial intelligence use should not be limited to technical infrastructure alone. It is important to establish policies that support human resources, protect professional roles, and define an ethical framework. Continuous education programs, guiding practices, and professional counseling mechanisms should be developed so that health professionals can preserve their professional identities in the face of technological change. This progressive transformation may also help nurses who guide clinical practice and internship programs to take leadership in the use of artificial intelligence and contribute to overcoming knowledge deficiencies.

Moreover, the ethical dimension of artificial intelligence use in health care should be made more visible. Issues such as patient privacy, data security, algorithmic bias, accountability for decisions, and the preservation of human oversight will remain among the principal areas of discussion for future health professionals. Therefore, not only technological competence but also ethical decision-making ability should be regarded as an important component of health education. Addressing students' knowledge deficiencies in this field and providing accurate guidance may both facilitate the proper functioning of artificial intelligence use and help alleviate future concerns. In conclusion, although the increasing use of artificial intelligence in health care appears inevitable, this process must be managed in a balanced way within a human-centered understanding of health care services.

To make effective use of the opportunities offered by technological developments, it is important to support the knowledge, skills, and professional adaptation processes of both current health professionals and students. Students in the health sciences should be considered a key focal group in this regard. In future research, it will be important to move beyond examining only the level of students' anxiety toward artificial intelligence and instead to evaluate

comprehensively the relationships between such anxiety, professional concerns, levels of trust in technology, and educational needs. The early identification of students' professional concerns will contribute to a more effective and sustainable integration of artificial intelligence-supported systems into health education programs.

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CHAPTER 6

THE BALANCE OF ARTIFICIAL INTELLIGENCE AND EMOTIONAL INTELLIGENCE IN THE FUTURE OF NURSING

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Abstract

With the acceleration of digital transformation in healthcare, artificial intelligence (AI) applications are increasingly integrated into nursing care processes. These applications support decision-making in healthcare, contributing significantly to the enhancement of care quality while also offering the potential to reduce nurses' workload and improve patient outcomes. AI can decrease error rates in patient monitoring, automate routine and time-consuming tasks, and enable nurses to dedicate more time to direct patient care. In this regard, AI is recognized as a powerful tool that enhances efficiency, safety, and quality in healthcare. However, the human aspects that form the foundation of nursing—such as empathy, effective communication, ethical sensitivity, and individualized care—cannot be sustained by technological

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competence alone. At this point, emotional intelligence becomes critically important, enabling nurses to recognize and manage their own emotions, understand the emotions of patients and team members, and strengthen the care relationship. Achieving a balance between AI and emotional intelligence in the future of nursing will ensure that technological advancements are integrated with a human-centered approach to care. This chapter explores the role of AI in nursing practice, the impact of emotional intelligence on care quality, and the contributions of evaluating these two concepts together to the future of the profession. Furthermore, it emphasizes the necessity of simultaneously developing digital competencies and emotional skills in nursing education.

Keywords: Artificial Intelligence, Emotional Intelligence, Nursing

Introduction

With the acceleration of digital transformation in healthcare, artificial intelligence (AI) applications have become critical technological tools that reshape nurses' access to information, clinical decision-making, patient monitoring, and care processes (Hacıaloğlu et al., 2025). Through big data analytics, clinical decision support systems, robotic care technologies, and predictive algorithms, nursing practice has gained speed, accuracy, and efficiency; however, maintaining the human-centered nature of care has become increasingly important (Singh et al., 2025; Wah, 2025). In particular, in future healthcare systems, the sustainability of humanistic care skills is as fundamental to professional competence as technological proficiency (Hussien et al., 2025). Nursing is not solely based on technical knowledge and application; it is a profession that demands high-level emotional competencies, including empathy, understanding emotions, effective communication, compassionate engagement, and holistic care (Ghanbari-Afra et al., 2022). At this point, emotional intelligence plays a critical role, enabling nurses to manage their own emotions, recognize patients' emotional needs, and establish therapeutic relationships during the care process (Dugué et al., 2021).

Although AI systems are among the most significant elements facilitating the management of clinical processes, the capacity to interpret a patient's fear, anxiety, uncertainty, and need for trust remains at the core of human interaction. This makes the integration of AI's technological capabilities with the human-centered care values represented by emotional intelligence a critical issue in the future of nursing (Ali et al., 2021). A care approach focused solely on technology may compromise patient satisfaction, ethical sensitivity, and care quality, whereas emphasizing only the humanistic aspect while neglecting technological advancements may hinder the profession's

adaptation to contemporary requirements. Therefore, future nurses are expected to develop both digital competencies and emotional awareness simultaneously (Morrow et al., 2023). In this context, understanding the balance between AI and emotional intelligence holds strategic importance for restructuring nursing education and developing sustainable, human-centered care models in clinical practice. This chapter aims to examine the significance of balancing AI and emotional intelligence in the future of nursing and explore strategies that can be implemented to achieve this balance.

Applications of Artificial Intelligence in Nursing

This section provides a detailed examination of the applications of artificial intelligence (AI) in nursing practice. AI reduces nurses' workload and enhances care quality through tools such as clinical decision support systems, risk assessments, and patient monitoring systems (Ventura-Silva et al., 2024; Jiang et al., 2026). It is also utilized in areas such as medication and treatment planning, as well as disease risk prevention. With AI-supported tools, nurses—the central component of healthcare delivery—can anticipate potential complications and improve care quality by reducing cognitive workload (Ahmad et al., 2023). The integration of AI in healthcare holds transformative potential for nursing practice by improving both clinical outcomes and operational efficiency (Hassanein et al., 2025). AI applications extend to virtual patient education, remote patient monitoring, epidemic surveillance, and medical imaging analysis (Nashwan et al., 2023).

AI-powered clinical decision support systems assist healthcare professionals in patient management and decision-making, while predictive analytics enable the anticipation of patient outcomes and identification of potential health risks. Additionally, AI-supported robotic systems enhance precision in surgical procedures, contributing to improved results (Shang et al., 2024). Beyond clinical applications, AI can support mental health services, enhance patient education, and strengthen patient-provider trust, thereby improving care quality and positively impacting healthcare professionals' workflows (Alowais et al., 2023; Dave & Patel, 2023; Oleribe et al., 2025).

In education, AI-based simulations and learning platforms allow nurses to enhance their knowledge and skills. In management processes, data analytics and predictive models are employed to optimize resource planning, patient safety, and service efficiency (Dave & Patel, 2023). Furthermore, the literature highlights strategies required to enable nurses to effectively use AI, including increasing technological literacy, adopting ethical and patient privacy guidelines, and aligning AI applications with nursing standards (Oleribe et

al., 2025). Integrating AI into future nursing practice at both practical and strategic levels is essential for improving care processes. However, realizing AI's transformative potential in healthcare necessitates addressing associated challenges.

Efforts should focus on improving the reliability, transparency, and ethical standards of AI technologies, aiming to positively contribute to global health outcomes (Shang et al., 2024). Given the rapid incorporation of technological innovations into healthcare and their unprecedented impact in recent years, emphasizing the concept of compassion within digital health is particularly important. For instance, during the COVID-19 pandemic in 2020, restrictions on traditional in-person healthcare delivery required nurses to adopt innovative approaches, such as using mobile phones, to support patients experiencing life-altering events, including death and loss of loved ones. This demonstrated that nurses must not only develop technological competence but also maintain the ability to deliver humane and compassionate care (Ali, 2022).

The Fundamental Role of Emotional Intelligence in the Nursing Profession

Emotional intelligence (EI) is the ability to perceive, understand, and manage one's own emotions as well as the emotions of others (Khademi et al., 2021). In nursing, EI plays a critical role not only in establishing effective communication with patients but also in ensuring the safety and accuracy of clinical decision-making processes (Tang et al., 2025). Clinical decision-making involves the nurse's use of knowledge, experience, observation, and intuition to determine the most appropriate care intervention, with EI emerging as a key determinant in this process (Abu Arra et al., 2023). Literature indicates that EI enhances clinical decision-making and that stress-adapted EI training is particularly important for nurses working in high-stress areas such as intensive care units (Tang et al., 2025). In critical and time-sensitive situations, EI supports maintaining composure under pressure, enabling more effective and accurate decisions in response to rapidly developing complications.

Nurses' ability to recognize their own emotional states and stress responses reduces evaluation errors arising from emotional bias, while the capacity to accurately assess patients' psychological states contributes to a more holistic evaluation of care needs. Through empathy, nurses can understand patients' needs, expectations, and concerns, shaping clinical decisions not only based on observable findings but also by considering psychosocial requirements. Personalized nursing, a core component of EI, aims to improve care quality by tailoring interventions to each individual's unique needs and

characteristics (Jandaghian-Bidgoli et al., 2025). However, individualizing care and strengthening patient-specific approaches may expose nurses to high emotional workloads, especially in intensive care, emergency, oncology, and other high-risk clinical settings. In these environments, nurses must simultaneously address patients' physical and psychosocial needs, manage their own emotional responses, control stress levels, and maintain professional resilience. Consequently, EI extends beyond understanding patients' emotions; it is a fundamental competency for recognizing nurses' own emotional needs, preventing burnout, and delivering sustainable care. A study examining the mediating role of EI in the relationship between technology-induced stress and burnout among intensive care nurses highlighted the importance of addressing both emotional burden and technology-related work pressures. The study emphasized that EI serves as a protective resource for coping with these multifaceted challenges, contributing significantly to the support of sustainable and healthy working conditions in increasingly technology-driven healthcare environments (Shaban et al., 2025).

Effective communication and collaboration among team members, facilitated by EI, strengthen the coordination of clinical practice, while emotional alignment within teams enhances the effectiveness of joint decision-making processes that support patient safety (Ghrayeb et al., 2025). Research examining the relationship between EI and interprofessional collaboration found a significant positive correlation; nurses working in supportive and high-quality work environments demonstrated higher levels of collaboration. The study further indicated that strengthened collaboration increased job satisfaction, supported professional commitment, and improved patient care quality, with benefits extending beyond nurses to patients, healthcare institutions, and the broader health system (Al-Hamdan et al., 2021).

EI is thus not only a trait that enhances interpersonal relationships but also an essential individual competency that fosters work engagement. Nurses capable of managing emotions, coping with stress, and maintaining healthy interpersonal interactions within the work environment exhibit higher professional motivation, greater organizational commitment, and stronger dedication to their roles. One study demonstrated that EI had significant and positive effects on nurses' job performance and work engagement (Turjuman & Alilyyani, 2023). Another study indicated that reinforcing humane approaches and caring behaviors in nursing practice can improve job satisfaction, reduce professional stress, and enhance harmony in nurse-patient interactions (Nal et al., 2026).

Covering key dimensions such as emotional awareness, empathy, stress management, intra-team communication, and ethical sensitivity, EI enables nurses to holistically assess patient conditions, accurately prioritize care needs, and make decisions appropriate to changing clinical circumstances. EI also facilitates sensitive responses to ethical dilemmas, allowing nurses to make decisions in line with patients' individual values and preferences (Ordu & Yılmaz, 2024). Consequently, EI is recognized as a fundamental professional competency that enhances the quality of clinical decision-making and supports patient safety and care effectiveness. Developing these skills positively influences both decision accuracy and patient satisfaction (Khademi et al., 2021). In this context, EI plays a critical role not only in individual decision-making but also in strengthening the holistic nature of nursing care. High levels of EI among nurses contribute to stronger therapeutic relationships, foster trust during the care process, and help patients feel understood and supported (Kılınc, 2024).

In clinical areas with high emotional demands, such as chronic disease management, end-of-life care, intensive care, and emergency situations, nurses' effective use of emotional awareness is decisive in maintaining care quality. Moreover, EI supports the development of professional relationships with colleagues, enhancing team cohesion and facilitating effective management. When EI becomes an integral part of organizational infrastructure, it supports effective leadership, nurtures collaboration, and strengthens adaptability (Freedman et al., 2025). As healthcare becomes increasingly complex and technology-intensive, evaluating both technical knowledge and emotional competencies is essential. Therefore, strengthening EI-related content in nursing practice and education is crucial for ensuring professional resilience and the sustainability of human-centered care in future healthcare environments (Dugué et al., 2021). Particularly in healthcare settings that require rapid decision-making, intensive interaction, and high responsibility, EI constitutes a key professional resource for coping with stress, communicating effectively, maintaining team cohesion, and delivering patient-centered care. With increasing digitalization, the expanding range of expected competencies for healthcare professionals further underscores the strategic importance of EI for both individual professional adaptation and the sustainability of care quality.

The Importance of Balancing Artificial Intelligence and Emotional Intelligence

In contemporary healthcare, advancing technologies and the widespread adoption of artificial intelligence (AI) have enhanced diagnostic and treatment

processes by enabling rapid data analysis, early warning systems, clinical decision support systems, and patient monitoring, thereby reducing nurses' workload and improving the accuracy of care processes (Chen et al., 2022). However, therapeutic communication, empathy, and ethical sensitivity remain indispensable elements of quality nursing care (Zhang et al., 2025). Nurses' compassionate care skills are a critical factor in delivering high-quality patient care.

Emotional intelligence enables nurses to manage their own emotions and stress responses, understand the emotional states of patients and team members, and make decisions accordingly (Khademi et al., 2021). The balanced integration of AI's technological capabilities with the human-centered approach provided by EI represents a critical strategy that enhances both care quality and patient safety. Decision-making processes based solely on AI may overlook humanistic and ethical dimensions, whereas relying exclusively on EI may limit the use of data and analytical insights. In this context, maintaining a balance between AI and EI in nursing practice strengthens patient-centered care personalization, improves intra-team coordination, and enhances the accuracy of clinical decisions. Integrating EI with AI in healthcare education supports professional development, fosters stronger emotional connections, and improves patient care outcomes, thereby enhancing empathy and patient satisfaction (Hachoumi & Eddabbah, 2025).

The integration of EI and AI has the potential to create a workforce that is both technologically competent and emotionally intelligent, promoting stronger interprofessional collaboration and improved patient outcomes. Additionally, nurses' ability to maintain their emotional skills while adapting to technological systems supports professional resilience and job satisfaction (Morrow et al., 2023). Future research examining the relationship between AI-enabled systems and EI, and how these competencies influence clinical performance, patient satisfaction, and care safety, could provide significant insights for the development of nursing education programs and clinical practice frameworks.

Conclusion and Recommendations

The balance between AI and EI in future nursing is critical for maintaining high-quality, human-centered care. AI offers significant opportunities to reduce nurses' workload, support clinical decision-making, and improve patient care processes, while EI allows nurses to preserve empathy, communication skills, and ethical decision-making in consideration of individual and cultural needs. Achieving balance between these two elements is decisive for patient safety, care quality, and nurses' professional satisfaction.

Consequently, nursing education programs should implement strategies that simultaneously develop AI literacy and EI competencies. At the organizational level, AI applications should be aligned with ethical and professional standards, with ongoing training and support mechanisms provided to ensure effective use of technology. Additionally, research and development initiatives should regularly evaluate the impact of AI applications in nursing practice, promoting approaches that both enhance patient care and support nurses' emotional competencies. Trust, ethical values, and human-centered communication are fundamental components of nursing. While AI and other technological tools can enhance nursing effectiveness, nursing practice devoid of compassion and a humanistic approach cannot be considered fully realized.

In future nursing, the balanced integration of technological competence and humanistic values will enhance care quality while preserving the ethical and professional foundations of the profession. Nursing curricula should incorporate AI literacy and digital skills while simultaneously strengthening EI, empathy, and ethical decision-making capabilities. In clinical practice, AI and robotic systems should be used to reduce nurses' workload and support clinical decisions, in combination with care processes that emphasize compassion and empathy. Continuous training, mentorship, and ethical guidelines within healthcare institutions should ensure the safe and appropriate use of AI applications. Data security, patient privacy, and adherence to ethical standards must remain priorities. The effects of AI on patient care, as well as on nurses' cognitive and emotional workload, should be monitored and evaluated regularly. Strategies should aim to continuously balance technological advancements with human-centered approaches. Nurses should prioritize compassionate, ethical, and patient-centered care while using technology as a tool. Implementing this approach at both individual and institutional levels will contribute to establishing a sustainable balance between AI and EI in the nursing profession.

Future research should examine the interplay between EI and AI in nursing practice. As AI-supported clinical decision systems become increasingly utilized, it is essential to investigate how nurses' EI levels influence adaptation to technology, trust-building, maintenance of humanistic patient interaction, and ethical decision-making. Such studies could illuminate the balance between technological competence and humanistic care skills, guiding the development of nursing education programs and fostering more holistic care models in clinical practice. Furthermore, assessing how nurses with high EI effectively use AI-supported systems may inform the redefinition of professional competencies in future digital healthcare environments.

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CHAPTER 7

FRAILITY IN INTENSIVE CARE UNIT PATIENTS: CLINICAL OUTCOMES AND IMPLICATIONS FOR NURSING CARE

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Abstract

This section examines the effects of frailty on clinical outcomes in intensive care unit patients and its implications for nursing care in light of current literature. With the increasing aging population at both global and national levels, frailty has become a common and significant geriatric syndrome in the intensive care unit setting. Frailty is characterized by decreased physiological reserve and function across multiple systems, leading to increased vulnerability to stressors, and is strongly associated with adverse outcomes such as mortality, prolonged hospital stay, need for mechanical ventilation, and functional dependency. The pathophysiology of frailty involves multifactorial mechanisms, including chronic inflammation, hormonal changes, oxidative stress, mitochondrial dysfunction, and sarcopenia. In the intensive care unit setting, factors such as immobilization and acute illness further exacerbate this condition by

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accelerating muscle loss and impairing recovery. Various tools, including the Fried Frailty Phenotype, Frailty Index, and Clinical Frailty Scale, are used to assess frailty, with Clinical Frailty Scale being particularly practical and widely applicable in clinical settings. Early identification of frailty in intensive care unit patients is crucial for recognizing high-risk individuals and developing individualized care plans. Nurses play a central role in this process through assessment, care planning, patient and family education, and coordination within the multidisciplinary team. The implementation of multicomponent interventions, such as nutritional support, early mobilization, medication management, and cognitive support, contributes to improved patient outcomes. In conclusion, integrating frailty assessment into routine clinical practice and developing targeted interventions are essential for improving both short- and long-term outcomes in intensive care unit patients.

Keywords: frailty, intensive care unit, geriatric syndromes, nursing care, sarcopenia, clinical outcomes

1. Introduction

Aging is an inevitable life process that is increasingly accelerating worldwide and causes significant physiological changes in human life (Ağar, 2020). The rapid increase in the population aged 65 years and older on a global scale brings the management of chronic diseases and geriatric syndromes to the forefront in healthcare systems. It is reported that the proportion of the elderly population in developed countries was approximately 20% in 2023 and is expected to reach 28% by 2050 (United Nations, 2023; WHO, 2015). Similarly, a comparable demographic transition is observed in Türkiye; the proportion of the population aged 65 years and older increased from 8.8% in 2018 to 10.2% in 2023. According to population projections, this rate is expected to continue to increase in the coming years (TÜİK, 2024).

This increase in the elderly population enhances the importance of the concept of frailty, which is one of the geriatric syndromes frequently encountered in clinical practice. Frailty is defined as a condition in which, due to a decrease in reserve and function across multiple physiological systems, an individual's vulnerability to internal and external stressors increases and even minor stressors can lead to disproportionate clinical deterioration (Hoogendijk et al., 2019; Kim & Rockwood, 2024). It is reported in the literature that frailty is strongly associated with adverse health outcomes such as falls, hospitalization, functional dependency, and mortality (Dent et al., 2019). In addition, the assessment of frailty is increasingly gaining importance in clinical practice in processes such as risk identification, care planning, and patient-

centered decision-making (Hoogendijk et al., 2019). In this context, frailty is closely associated with sarcopenia, which is another geriatric syndrome frequently observed in older individuals, and a decrease in muscle mass and muscle strength may contribute to the development of physical frailty (Cruz-Jentoft et al., 2019).¹

With the aging process, many physiological changes, which are a natural part of aging, occur. In addition, as a result of the interaction of multiple risk factors and physiological changes in older individuals, geriatric syndromes emerge. These multifactorial clinical conditions include falls, delirium, incontinence, pressure ulcers, malnutrition, dementia, depression, polypharmacy, sarcopenia, and frailty as examples of geriatric syndromes (Ates Bulut et al., 2018; Inouye et al., 2007). Among these syndromes, sarcopenia is characterized by a decrease in muscle mass, muscle strength, and physical performance associated with aging. This increases the risk of falls, functional dependency, hospitalization, and mortality in older individuals (Cruz-Jentoft et al., 2019). In addition, it is emphasized that there is a strong association between sarcopenia and frailty and that sarcopenia is one of the main biological components of physical frailty (Dent et al., 2019). The coexistence of frailty and sarcopenia in older individuals may be particularly determinative on clinical outcomes, especially during periods of acute illness. In patients receiving treatment in intensive care units, factors such as immobilization, systemic inflammation, and mechanical ventilation accelerate muscle loss and deepen frailty. This condition leads to a decrease in physiological reserves and causes patients to become more vulnerable to stressors. Indeed, it has been shown that frailty in intensive care patients is associated with mortality, length of stay in the intensive care unit, and functional dependency (Guidet et al., 2020; Schefold et al., 2020). In addition, frailty makes the process of weaning from mechanical ventilation more difficult and prolongs the duration of rehabilitation. In this context, the early assessment of frailty is of great importance in terms of identifying high-risk patients and individualizing care. The aim of this section is to examine the effects of frailty on clinical outcomes in intensive care patients and its implications for nursing care in line with the current literature.

2. Concept and Pathophysiology of Frailty

Frailty is a geriatric syndrome characterized by a decrease in an individual's resistance to stressors due to a loss of reserve and function across multiple physiological systems associated with aging, and by the fact that even minor stressors can lead to disproportionate clinical deterioration (Clegg et al., 2013;

Hoogendijk et al., 2019; Kahraman & Deniz, 2022). This condition causes disruption of homeostatic balance in the organism and makes the individual more susceptible to adverse health outcomes such as falls, hospitalization, functional dependency, and mortality.

The pathophysiology of frailty is a multifactorial and dynamic process. Chronic low-grade inflammation, hormonal changes, mitochondrial dysfunction, oxidative stress, and sarcopenia are among the main mechanisms involved in the development of frailty (Hoogendijk et al., 2019; Kim & Rockwood, 2024). In this process, an increase in inflammatory cytokines accelerates muscle protein breakdown, while hormonal changes reduce muscle synthesis, resulting in a marked decrease in muscle mass and muscle strength. In addition, frailty is not only a biological process but also a multidimensional syndrome that includes physical, psychological, and social components. Therefore, the early identification of frailty, the determination of older individuals at risk, and the planning of individualized care approaches are of critical importance in clinical practice (Dent et al., 2019). The pathophysiological mechanisms related to the development of frailty are summarized in Figure 1.

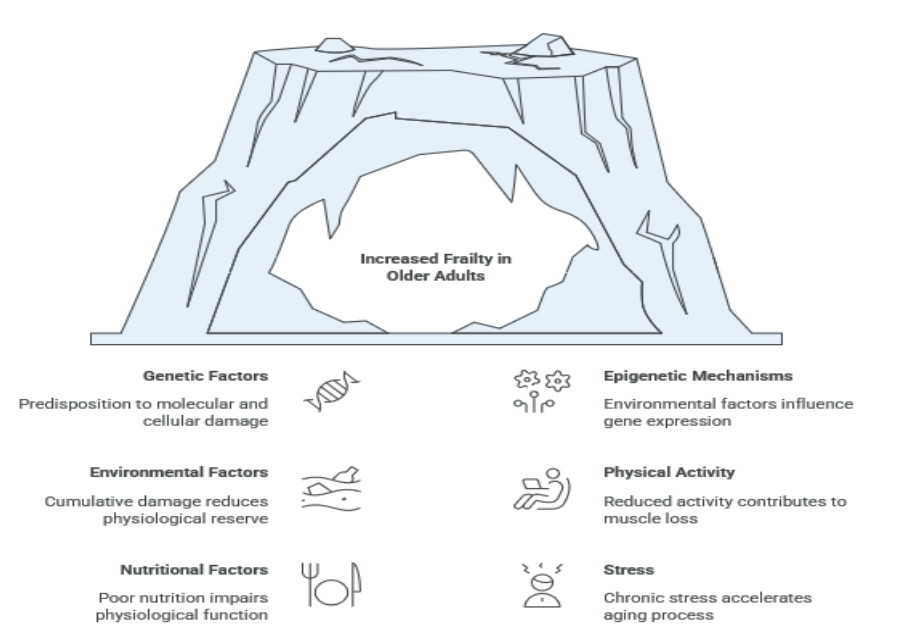


Figure 1. Pathophysiological Framework of Frailty in Older Individuals (Clegg et al., 2013).

3. Assessment of Frailty and Measurement Methods

Due to the multidimensional nature of frailty, there is no single gold standard assessment method that encompasses all its dimensions. This situation indicates that the selection of the measurement tool may vary depending on the population being evaluated, the clinical setting, and the purpose of the research. In this context, various measurement tools have been developed to assess frailty. These tools generally include different approaches, such as physical performance-based models, the cumulative deficit approach, and scales based on clinical assessment (Dent et al., 2019; Hoogendijk et al., 2019). The early and accurate assessment of frailty is of critical importance in terms of identifying individuals at risk and developing appropriate care plans.

One of the most commonly used models in the assessment of frailty is the Fried Frailty Phenotype model. This model, developed by Fried and colleagues, consists of five main criteria: unintentional weight loss, muscle weakness, slow walking speed, low physical activity level, and exhaustion. The presence of three or more criteria leads to the classification of the individual as frail (Fried et al., 2001). This model is preferred especially in clinical research because it defines frailty mainly based on physical components.

Another important approach is the Frailty Index model developed by Rockwood and colleagues. This model is based on the accumulation of health deficits present in the individual. In calculating the frailty index, a ratio is obtained by dividing the number of health deficits present in the individual by the total number of variables assessed. An increase in the obtained value indicates an increase in the level of frailty (Rockwood & Mitnitski, 2007). Unlike the phenotype model, this approach evaluates frailty within a more comprehensive framework, as it includes multiple variables such as comorbidities, cognitive status, and functional capacity.

In recent years, one of the tools that has come to the forefront in clinical practice due to its practicality and ease of use is the Clinical Frailty Scale (CFS). This scale enables the determination of the level of frailty through a clinical assessment based on the individual's functional independence and overall health status. It has been shown to be a valid and reliable tool, particularly in predicting mortality and adverse clinical outcomes in intensive care patients (Guidet et al., 2020).

The systematic assessment of frailty in the intensive care setting is determinative in predicting the clinical course of patients and individualizing the care process. Therefore, it is important for intensive care nurses to be

proficient in frailty assessment tools and to integrate these tools into clinical care processes, as this may contribute to the improvement of patient outcomes. In this context, a more detailed examination of the effects of frailty on clinical outcomes in intensive care patients will contribute to the development of care approaches for this patient group.

4. Frailty and Clinical Outcomes in Intensive Care Unit Patients

The number of older patients receiving treatment in intensive care units is steadily increasing worldwide. Due to the high prevalence of geriatric syndromes in the older population, frailty has emerged as an important and increasingly prevalent clinical problem in intensive care patients. In various studies, the prevalence of frailty in intensive care patients has been reported to range between 30% and 50%, indicating that frailty is highly common in the intensive care population (Bagshaw et al., 2014; Muscedere et al., 2017).

It has been demonstrated in numerous studies that frailty in intensive care patients is associated with adverse clinical outcomes such as mortality, length of hospital stay, the need for mechanical ventilation, and functional dependency (Bagshaw et al., 2014; Guidet et al., 2020). In particular, frailty is defined as an independent risk factor for these outcomes. In a multicenter cohort study conducted by Bagshaw and colleagues, it was reported that frail patients had significantly higher intensive care and hospital mortality rates compared to non-frail patients (Bagshaw et al., 2014). Similarly, in a multicenter study conducted in Europe, it was shown that frailty is one of the independent predictors of 30-day mortality in patients aged 80 years and older who were acutely admitted to the intensive care unit (Guidet et al., 2020).

The association between frailty and adverse clinical outcomes in intensive care patients is largely explained by a decrease in physiological reserves and increased vulnerability to stressors. In the intensive care setting, immobilization, systemic inflammation, and the acute illness process further reduce physiological reserves, thereby deepening frailty. This condition negatively affects the recovery process of patients, leading to prolonged rehabilitation duration and an increased risk of long-term morbidity. In this context, the early assessment of frailty in intensive care patients, the identification of high-risk patient groups, and the planning of appropriate treatment and care strategies are of great importance.

5. Approach to the Frail Patient in Intensive Care Nursing

The early identification of frailty in intensive care patients and its inclusion in the care plan is considered a fundamental clinical approach for improving patient outcomes. Current guidelines and the literature recommend the adoption of a multidisciplinary and holistic approach in the care of frail individuals (Antoniadou et al., 2024; Dent et al., 2019; Kim & Rockwood, 2024). In this context, the application of multicomponent and individualized care strategies, such as early screening and systematic assessment, nutritional support, early mobilization, medication management, cognitive support, and environmental modifications, is recommended in the management of frail patients.

In clinical practice, the use of practical and easily applicable tools, particularly the Clinical Frailty Scale, is recommended for the assessment of frailty. In this way, the level of frailty in intensive care patients can be determined at an early stage, and the care plan can be organized in accordance with the patient's functional status and individual needs (Guidet et al., 2020). It is known that the risk of malnutrition is high in frail patients. Therefore, ensuring adequate protein and energy intake, implementing early mobilization programs, and planning rehabilitation approaches aimed at preventing muscle loss are among the fundamental components of care (Schefold et al., 2020).

In addition, conditions frequently observed in the intensive care setting, such as polypharmacy, immobilization, and cognitive impairment, may further increase frailty. Accordingly, it is necessary to regularly review medications, support early mobilization, and plan care practices aimed at reducing the risk of delirium (Kim & Rockwood, 2024; Schefold et al., 2020). In particular, delirium prevention strategies (supporting sleep regulation, ensuring orientation, and regulating environmental stimuli) are of critical importance in frail patients.

When international guidelines are examined, it is seen that a multidisciplinary approach is fundamental in the care of frail patients and that nurses have a coordinating and implementing role in this process. Intensive care nurses take an active role in early identification, care planning, patient and family education, and supporting the rehabilitation process. They are also in a central position in ensuring the continuity of care and coordinating communication within the team. In this context, increasing nurses' awareness of frailty and integrating frailty assessment into clinical care processes will make a significant contribution to improving patient outcomes (Antoniadou et al., 2024).

Table 1. Key Findings and Recommended Approaches Reported in the Literature for the Management of Frailty in Intensive Care Patients

Authors	Year	Study Design	Population	Findings and Recommendations
Antoniadou et al.	2024	Guideline appraisal review	Older adults	It is stated that a multidisciplinary approach is fundamental in frailty management, and it is emphasized that the combined implementation of nutrition, exercise, cognitive support, medication management, and environmental modifications may improve patient outcomes (Antoniadou et al., 2024).
Dent et al.	2019	Review (Lancet)	Older adults	It is stated that early identification of frailty and the implementation of a multidisciplinary care plan are important in reducing functional decline and improving clinical outcomes (Dent et al., 2019).
Kim & Rockwood	2024	Review	Older adults	It is emphasized that early assessment of frailty and the development of individualized care plans play a critical role in patient management and that a multidisciplinary approach is necessary (Kim & Rockwood, 2024).
Guidet et al.	2020	Multicenter cohort (VIP2)	ICU patients (≥80 years)	It has been shown that the Clinical Frailty Scale is effective in predicting mortality and clinical outcomes in ICU patients and contributes to the early identification of high-risk patients (Guidet et al., 2020).
Schefold et al.	2020	Review	ICU patients	It is stated that muscle loss and weakness are common in critically ill patients and that early mobilization and nutritional support may reduce this process and support recovery (Schefold et al., 2020).
Muscedere et al.	2017	Systematic review	ICU patients	It is reported that frailty is associated with increased mortality and morbidity in ICU patients and may be used as a prognostic indicator (Muscedere et al., 2017).
Flaatten et al.	2017	Cohort	ICU patients	It has been shown that the Clinical Frailty Scale is a reliable and applicable assessment tool in older ICU patients (Flaatten et al., 2017).

Geense et al.	2020	Cohort	ICU survivors	It is emphasized that frailty and functional decline may develop in the post-ICU period and require long-term follow-up (Geense et al., 2020).
Bruno et al.	2023	Cohort	ICU patients	It has been shown that frailty is strongly associated with ICU mortality and long-term functional dependency and should be considered in clinical decision-making processes (Bruno et al., 2023)

6. Conclusion

In this section, the effects of frailty on clinical outcomes in intensive care patients and its implications for nursing care have been addressed within a holistic framework in line with the current literature. With the increasing elderly population, frailty has become a problem with high prevalence in the intensive care setting and directly affects clinical decision-making processes. Current evidence indicates that frailty is independently and strongly associated with adverse clinical outcomes such as mortality, length of stay in the intensive care unit, the need for mechanical ventilation, and functional dependency. This situation demonstrates that frailty is a fundamental clinical indicator that should be routinely assessed in intensive care patients.

Considering the multidimensional nature of frailty, the systematic early assessment of patients, the identification of individuals at risk, and the individualization of care plans are among the fundamental components of clinical care. In this process, intensive care nurses assume a central role in the early identification of frailty, the planning and implementation of appropriate care strategies, and patient and family education. The integration of frailty assessment into clinical care processes represents a practical approach that can directly contribute to improving patient safety and clinical outcomes. Furthermore, in the management of frail patients, it is necessary to adopt multicomponent and multidisciplinary care approaches, including nutritional support, early mobilization, cognitive support, and medication management. The integration of these approaches into standard care protocols is of critical importance not only for short-term outcomes but also for improving long-term functional outcomes. Future studies are expected to demonstrate, at a high level of evidence, the effectiveness of frailty-specific targeted interventions and their impact on clinical outcomes.

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CHAPTER 8

SARCOPENIA AS A GERIATRIC SYNDROME: PREVALENCE, RISK FACTORS, AND MANAGEMENT

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Abstract

The increasing proportion of the older population worldwide has led to a higher prevalence of geriatric syndromes such as sarcopenia, thereby imposing a significant burden on healthcare systems. Sarcopenia is characterized by a decline in muscle mass, muscle strength, and physical performance, and is associated with serious outcomes, including falls, fractures, functional dependence, and mortality. Multifactorial mechanisms contribute to its development, including hormonal changes, inflammatory processes, oxidative stress, physical inactivity, and inadequate nutrition. Major risk determinants include age, nutritional status, comorbid chronic diseases, smoking, and lifestyle factors such as sleep patterns. Early identification through appropriate screening tools is crucial for preventing adverse health outcomes and complications, as well as for improving the quality of life of older adults. While pharmacological approaches have limited evidence, non-pharmacological interventions particularly nutrition and exercise, play a central role in management. Nurses have a key role in the early detection of sarcopenia, identification of risk factors, and planning of individualized care. In conclusion, early screening, promotion of healthy

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lifestyle behaviors, and a multidisciplinary approach are essential components in the prevention and management of sarcopenia.

Keywords: Sarcopenia, Aging, Geriatrics, Risk factors, Nursing care, Care management

1. Introduction

The size of the global population and the proportion of older adults are steadily increasing. The pace of population aging is faster than in the past, and people are living longer worldwide. According to data from the World Health Organization (WHO), by 2030, one in six people is expected to be aged 60 years and over. By 2050, the population aged 60 years and above is projected to double, reaching 2.1 billion. Although the shift in population distribution toward older age groups initially began in high-income countries, the most substantial changes are occurring in low and middle-income countries. The proportion of individuals aged 65 years and older, defined as the older population, is increasing globally (WHO 2025). As of 2025, older adults constitute 10.4% of the global population. In Turkey, which is undergoing a “demographic transition” characterized by global aging, declines in fertility and mortality rates, along with advancements in healthcare, have contributed to increases in life expectancy, living standards, and overall welfare. As a result, the age structure of the population has changed. While the proportion of children and young individuals has decreased, the proportion of older adults has increased. Although Turkey still has a relatively young population structure compared to countries with higher proportions of older populations, the absolute number of older individuals is considerably high. In the past five years, the population aged 65 years and over has increased by 20.5%, reaching 11.1% in 2025. Population projections indicate that this increase will continue (TÜİK, 2025). At the global level, all countries face significant challenges in response to this demographic change. Therefore, health and social systems must be prepared for this transformation. In addition, globalization, technological developments, urbanization, changing gender norms, and migration affect the lives of older individuals. Considering these existing and potential factors, taking necessary measures and developing appropriate policies are of critical importance (WHO, 2025).

At the biological level, aging occurs as a result of the accumulation of molecular and cellular damage over time. This process leads to a gradual decline in physical and mental capacity, an increased risk of disease, and ultimately death. These changes vary among individuals. Such variability is influenced by factors including ethnicity, gender, and physical and social environments,

thereby contributing to health inequalities. In addition to biological changes, aging is accompanied by various social, environmental, and psychological transitions, such as retirement and the loss of spouses and friends. Old age is characterized by numerous complex health problems referred to as geriatric syndromes, which arise from the interaction of multiple underlying factors (WHO 2025). Health conditions that are frequently observed in older adults and lead to increased morbidity and mortality are defined as geriatric syndromes. These include urinary incontinence, falls, pain, malnutrition, frailty, and sarcopenia. Sarcopenia is one of the major syndromes associated with aging. It is a progressive and generalized skeletal muscle disorder (Cruz-Jentoff et al., 2019). Sarcopenia is defined as a progressive syndrome characterized by the loss of skeletal muscle mass and muscle strength. It is associated with adverse outcomes such as physical disability, falls, fractures, mortality, metabolic disorders, and cognitive impairment (Bayrak Kahraman & Deniz, 2022; Yuan & Larsson, 2022). Additionally, sarcopenia is linked to negative health outcomes including postoperative complications, prolonged hospital stay (Chung et al., 2021), and reduced quality of life (Chung et al., 2021; Efe et al 2021; Yuan & Larsson, 2022).

Sarcopenia is a significant geriatric syndrome that is commonly observed among older adults worldwide (Choo & Chang, 2021; Wang et al., 2025; Yang et al., 2022). It is well established that the prevalence of sarcopenia increases with advancing age. In a systematic review and meta-analysis conducted in China, the prevalence of sarcopenia was reported as 20.7%, with the highest prevalence observed in individuals aged 80 years and older (Meng et al., 2024). In a similar study conducted in Africa, the prevalence was found to be 25.7% (Veronose et al., 2024). In the Asian population, a study conducted in 2021 among individuals aged 60 years and over with diabetes reported a sarcopenia prevalence of 15.9% (Chung et al., 2021). A more recent study indicated that this rate ranges between 23.1% and 25.8% (Wang et al., 2025). In Turkey, sarcopenia also represents a major public health concern (Döngelli et al., 2025; Efe et al., 2021). In a study conducted in 2021, the prevalence of sarcopenia was found to be 16.7%; this rate was 11.8% among individuals living in rural areas and 21.6% among those living in urban areas. The same study demonstrated that the prevalence of sarcopenia increases with age (Efe et al., 2021). In a cross-sectional study conducted with hospitalized patients in gastroenterology clinics across different geographical regions of Turkey, the prevalence of sarcopenia risk was reported as 32.7%. This study identified a strong association between malnutrition and sarcopenia. Additionally, the risk of sarcopenia was found to be significantly higher in patients diagnosed with liver cirrhosis, gastrointestinal malignancies, and diabetes mellitus. Advanced

age, female sex, presence of malnutrition, liver cirrhosis, and heart failure were identified as independent risk factors for sarcopenia (Bengi et al., 2025).

2. Pathophysiology of Sarcopenia

With the aging process, a decline in physical activity levels contributes to reductions in muscle mass and muscle function, thereby predisposing individuals to the development of sarcopenia. As sarcopenia progresses, individuals tend to perceive exercise and physical activities as more strenuous, leading to avoidance of such activities; this, in turn, increases physical inactivity and creates a vicious cycle that exacerbates the severity of sarcopenia. The development of sarcopenia is a multifactorial process resulting from the interaction of numerous hormonal, inflammatory, neuromuscular, and environmental factors. In this context, decreases in anabolic hormones such as growth hormone, insulin-like growth factor-1 (IGF-1), androgens, and estrogens lead to reduced muscle protein synthesis and subsequent loss of muscle mass. Furthermore, aging is associated with increased release of proinflammatory cytokines, including tumor necrosis factor- α (TNF- α), interleukin-1 beta (IL-1 β), and interleukin-6 (IL-6), which contribute to the development of chronic low-grade inflammation and accelerate muscle catabolism. In the pathogenesis of sarcopenia, nutritional factors such as decreased vitamin D levels, impaired muscle regeneration capacity, reduced muscle protein synthesis, and inadequate protein intake also play a significant role. Additionally, increases in fat mass, elevated oxidative stress, loss of motor neurons, disruptions in the reorganization of neuromuscular structures, and alterations in gene expression contribute to the progression of the condition. Physical inactivity is considered both a key risk factor in the development of sarcopenia and a critical component that accelerates disease progression (Bayrak Kahraman & Deniz, 2022).

3. Risk Factors for Sarcopenia

The primary factors associated with the development of sarcopenia include advanced age, body mass index, malnutrition, low levels of physical activity, and smoking. In addition, chronic conditions such as osteoporosis, osteoarthritis, depression, cognitive impairment, and diabetes mellitus are among the important clinical conditions associated with sarcopenia. Furthermore, it has been reported that sarcopenia may not only be a consequence but also a risk factor for the development of cognitive impairment (Meng et al., 2024; Yang et al., 2022; Yuan & Larsson, 2023). Beyond age and comorbid diseases, sociodemographic characteristics such as marital status, race, and level of education have also been identified as factors associated with sarcopenia

(Moreira et al., 2019). Additionally, lifestyle-related factors including alcohol consumption, sleep patterns, and other behavioral factors may influence the development of sarcopenia (Yuan & Larsson, 2023). Sarcopenia is also closely associated with conditions that are more prevalent in older adults, such as end-stage renal disease, bone and joint disorders, endocrine diseases, cancer, and stroke. Moreover, frailty and vitamin D deficiency are recognized as important contributing factors in the development of sarcopenia. A sedentary lifestyle, immobilization, and age-related structural and functional changes in the musculoskeletal system are also considered significant risk factors. Nutritional factors play a critical role in the etiology of sarcopenia. Low protein and energy intake, micronutrient deficiencies, malabsorption, gastrointestinal disorders, and anorexia are among the key determinants contributing to the development of sarcopenia (Cruz-Jentoff et al., 2019).

4. Sarcopenia Screening Tools

Various tools and tests are used for the screening of sarcopenia. The selection of these tools may vary depending on the older individual's level of disability and mobility, access to healthcare services, and the purpose of the assessment. According to the criteria of the European Working Group on Sarcopenia in Older People (EWGSOP2), sarcopenia is evaluated based on low muscle strength, low muscle mass or quality, and low physical performance. EWGSOP2 recommends the use of the SARC-F questionnaire to obtain self-reported information from patients regarding the characteristic symptoms of sarcopenia. This tool can be easily applied in both community health services and clinical settings (Cruz-Jentoff et al., 2019; Dent et al 2018). The SARC-F (Strength, Assistance in walking, Rise from a chair, Climb stairs, and Falls) test is a five-item screening tool used to assess the risk of sarcopenia. It is based on the older individual's perceived limitations in strength, walking ability, rising from a chair, climbing stairs, and experiences of falls (Cruz-Jentoff et al., 2019). In this screening test, scores range from a minimum of 0 to a maximum of 10. This tool enables the identification of individuals at high risk for sarcopenia. Individuals scoring four or higher are considered to require further evaluation for sarcopenia (Bahat et al., 2018) (Table 1). As an alternative, more formal case-finding tools may be preferred in clinical populations where sarcopenia is suspected. For example, the Ishii screening test is a method used to estimate the likelihood of sarcopenia by employing a score derived from an equation based on three variables: age, handgrip strength, and calf circumference (Cruz-Jentoff et al., 2019; Locquet et al., 2018).

Table 1. SARC-F Screening Test

Parameter	Question	Point
Power	How much difficulty do you experience when lifting and carrying items up to 10 kilograms?	0 = None 1 = A little 2 = A lot or I can't
Walking with assistance	How difficult is it for you to walk around a room?	0= Not at all 1= A little 2= A lot, or with help, or I can't
Getting up from the chair	How much difficulty do you have getting up from a chair or bed?	0 = None 1 = A little 2 = A lot, or with help, or I can't
Climbing Stairs	How difficult does it get for you to climb a 10-step staircase?	0 = None 1 = A little 2 = A lot or I can't
Fall	How many times have you fallen in the last year?	0 = None 1 = 1-3 2 = 4 or more

5. Treatment Approaches in Sarcopenia

It has been reported that there is no full consensus or standardized treatment protocols for the prevention and management of sarcopenia (Kim et al., 2025). Nevertheless, identifying the underlying pathophysiological mechanisms, particularly abnormal molecular pathways and hormonal alterations, is essential for effective treatment. Pharmacological treatment options include testosterone, anabolic steroids, selective androgen receptor modulators, growth hormone, insulin-like growth factor-1 (IGF-1), ghrelin, myostatin and activin-2 receptor inhibitors, espendolol, and angiotensin-converting enzyme inhibitors. However, the correction of malnutrition is one of the fundamental components of sarcopenia management. It is reported that antioxidant supplementation (selenium, vitamin C, calcium, magnesium) and phosphorus may be beneficial, while vitamin D plays a critical role in maintaining muscle strength and enhancing protein anabolism and should be maintained at optimal levels (Bayrak Kahraman & Deniz, 2022).

Among non-pharmacological treatment approaches, exercise and nutritional interventions are of primary importance. Lifestyle modifications, including healthy nutrition, regular physical activity, and avoidance of smoking, are closely associated with sarcopenia. In particular, combined

approaches involving resistance exercise and nutritional supplementation are recommended. However, further research is needed to determine the most effective components of exercise and nutrition programs in terms of duration, frequency, and intensity (Kim et al., 2025). Resistance exercise is considered the cornerstone of primary treatment for sarcopenia, while aerobic exercise has been reported to be particularly effective in maintaining lower extremity muscle function. In one study, participation in a resistance exercise program performed twice weekly for 12 weeks resulted in significant improvements in balance, gait speed, handgrip strength, muscle mass, chair-rise performance, and quality of life among older adults (Hernandez et al., 2023). Within the scope of nutritional support, a daily protein intake of 1–2 g/kg and the consumption of essential amino acids, particularly those rich in leucine, are effective in increasing muscle mass and function (Bayrak Kahraman & Deniz, 2022). Additionally, such interventions are beneficial in preventing muscle loss associated with prolonged immobilization. The combined use of leucine and vitamin D has been reported to improve handgrip strength and gait speed, while β -hydroxy- β -methylbutyrate (HMB) and HMB-containing nutritional supplements have demonstrated positive effects on muscle mass and physical performance (Kim et al., 2025)

6. Nursing Care in Sarcopenia

Nursing care for older adults with sarcopenia involves a holistic approach that includes comprehensive assessment and the provision of preventive care. Identifying risk factors prior to the onset of sarcopenia and planning preventive nursing interventions are of critical importance. Nurses play a key role in educating the community and promoting the adoption of healthy lifestyle behaviors aimed at preventing sarcopenia, such as ensuring adequate and balanced nutrition, initiating and maintaining individualized physical activity, and supporting socially and psychologically active living. Care planning should be conducted by considering the individual characteristics, habits, preferences, social support systems, and lifestyle of older adults, and when necessary, in collaboration with other members of the healthcare team. In cases of suspected or confirmed sarcopenia, cooperation with physiotherapists and dietitians is essential to plan appropriate physical activity programs aimed at improving muscle strength. Planning interventions focused on nutrition, physical activity, and the prevention of potential complications is crucial for enhancing quality of life. Additionally, interventions aimed at reducing disability associated with sarcopenia and improving quality of life should be developed collaboratively with the multidisciplinary team. Furthermore, it is of utmost importance to protect older individuals from inappropriate recommendations and practices

provided by non-health professionals that may potentially cause harm (Özkaya & Sağlam Küçükgülü, 2021).

The prevention and early detection of sarcopenia are essential for reducing adverse health outcomes. Therefore, screening using appropriate methods is critically important for promoting and supporting healthy aging. In the management of sarcopenia, it is emphasized that nurses working in primary healthcare settings should integrate screening into routine visits, home care practices, and all health assessments, and that they should assume a leadership and proactive role within the multidisciplinary team during comprehensive geriatric evaluation when risk is identified. Attention is also drawn to the importance of routine screening and the implementation of necessary measures to prevent adverse outcomes associated with sarcopenia, such as falls, fractures, reduced mobility, and functional decline (Longobucco et al., 2025). For high-risk populations in particular, early diagnosis, prevention, and intervention strategies are crucial for delaying the onset and progression of sarcopenia (Meng et al., 2024). Among healthcare professionals, nurses are ideally positioned to conduct screening, implement preventive measures, and manage care in all healthcare settings due to their continuous contact with patients. Nurses play a key role in promoting early detection and multidisciplinary management to preserve muscle health and independence in older adults (Longobucco et al., 2025). The effective fulfillment of these roles by nurses will significantly contribute to individualized assessment, identification of existing physiological and functional status, and determination of care needs in older individuals. It is recommended to enhance nurses' knowledge and awareness regarding sarcopenia, an important geriatric syndrome, and to increase the implementation of preventive interventions as well as research in this field. Furthermore, educational programs are needed to improve nurses' awareness and knowledge levels regarding the management of sarcopenia and the dissemination of up-to-date information (Özkaya and Sağlam Küçükgülü, 2021).

7. Clinical Practice Recommendations in Sarcopenia

It is important to comprehensively evaluate age-related physical, social, psychological, and economic changes in older adults through a multidisciplinary team approach (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018). Clinical practice recommendations for older adults with sarcopenia are presented below.

Sarcopenia Screening: Individuals aged 65 years and older should be screened for sarcopenia annually or following the onset of significant health problems. Screening may be conducted using gait speed or the

SARC-F questionnaire. Individuals with a positive screening result require further assessment to confirm the presence of the condition (Strength of recommendation: Conditional; Certainty of evidence: Low) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Diagnosis: For the diagnosis of sarcopenia, it is recommended to use any established consensus definition in conjunction with an objective measurement tool (Strength of recommendation: Conditional; Certainty of evidence: Moderate). Dual-energy X-ray absorptiometry (DXA) is recommended to determine low lean body mass in the diagnosis of sarcopenia (Strength of recommendation: Conditional; Certainty of evidence: Low). To assess low muscle strength and physical performance, gait speed or handgrip strength should be used (Strength of recommendation: Strong; Certainty of evidence: Moderate) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Physical Activity: Resistance-based exercise programs may be effective in improving lean body mass, muscle strength, and physical function (Strength of recommendation: Strong; Certainty of evidence: Moderate) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Protein: Clinicians are advised to consider protein supplementation or a protein-rich diet (Strength of recommendation: Conditional; Certainty of evidence: Low). Clinicians should discuss the importance of adequate protein and caloric intake with older adults (Strength of recommendation: Conditional; Certainty of evidence: Very low). Nutritional (protein) interventions should be combined with physical activity (Strength of recommendation: Conditional; Certainty of evidence: Low) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Vitamin D: There is insufficient evidence to determine whether vitamin D supplementation alone is effective in the treatment of sarcopenia in older adults (Strength of recommendation: Insufficient evidence; Certainty of evidence: Very low) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Anabolic Hormones: Current evidence is insufficient to recommend anabolic hormones for the management of sarcopenia (Strength of recommendation: Insufficient evidence; Certainty of evidence: Very low) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018)

Pharmacological Interventions: Pharmacological interventions are not recommended as first-line treatment for the management of sarcopenia (Strength of recommendation: Insufficient evidence; Certainty of evidence: Very low) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

Research: Future international collaboration and large-scale randomized controlled trials, particularly focusing on older adults with sarcopenia, are recommended (Strength of recommendation: Insufficient evidence; Certainty of evidence: Not available) (Bayrak Kahraman & Deniz, 2022; Dent et al., 2018).

According to the GRADE guidelines, categorical definitions of the strength and certainty of evidence are given in Table 2 (Bayrak Kahraman & Deniz, 2022).

Table 2: According to GRADE guidelines, categorical definitions of the strength and certainty of evidence

Category	Description
Strength of the recommendation	
Strong	A strong recommendation indicates that the benefits of the intervention likely outweigh any associated risk; most clinicians would prescribe this intervention, and most patients would want to receive this type of intervention
Conditional (weak)	A conditional recommendation indicates that clinicians would only refer the intervention under specific conditions because there is a fine balance between risks and burdens. Whilst many health practitioners would recommend the intervention, others would not; burdens include unwanted side effects and increased risk of adverse outcomes which undermine the health benefits of the intervention. A conditional recommendation was also given when patient values were unknown regarding the intervention, or if there was substantial variation in patient preferences/values .
Certainty of evidence	
High	Further research is very unlikely to change confidence in the estimate of effect.
Moderate	Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low	Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low	Any estimate of effect is very uncertain

8. Conclusion

In this section, sarcopenia, whose importance is increasing with the global aging process, has been addressed from the perspective of epidemiology, pathophysiology, risk factors, screening methods, treatment approaches, and nursing care. Rather than being an inevitable consequence of aging, sarcopenia is a geriatric syndrome that can be prevented and managed through early diagnosis and appropriate interventions. With the aging population, the increasing prevalence of sarcopenia necessitates addressing this condition not only as an individual health issue but also as a social and economic concern. The multifactorial etiology of sarcopenia limits the effectiveness of unidimensional approaches in its management. Therefore, fundamental treatment strategies, particularly lifestyle modifications such as resistance exercise and adequate protein intake, have gained prominence. The limited evidence regarding pharmacological treatments highlights the need to prioritize non-pharmacological interventions in clinical practice.

Nurses play a pivotal role in the early identification of sarcopenia, monitoring of risk factors, and implementation of preventive care, as they maintain continuous contact with individuals. In particular, integrating sarcopenia screening into routine assessments across all clinical care settings, especially in primary care and home care, is critical for preventing adverse health outcomes. There is a need for the standardization of intervention programs for sarcopenia management and for high-quality evidence demonstrating the effectiveness of nursing care. In this context, future research should be designed with large sample sizes, randomized controlled methodologies, and multidisciplinary approaches. In conclusion, a multidisciplinary model supported by early screening, individualized care, lifestyle modifications, and a holistic and robust nursing approach should be adopted in the management of sarcopenia. This approach will contribute to improving the quality of life of older adults by preserving their functional independence.

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